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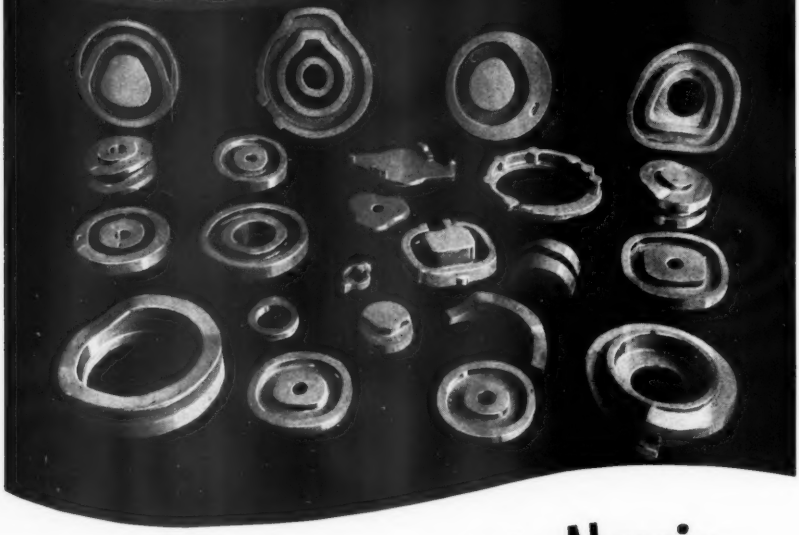

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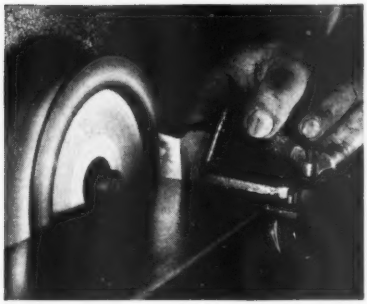

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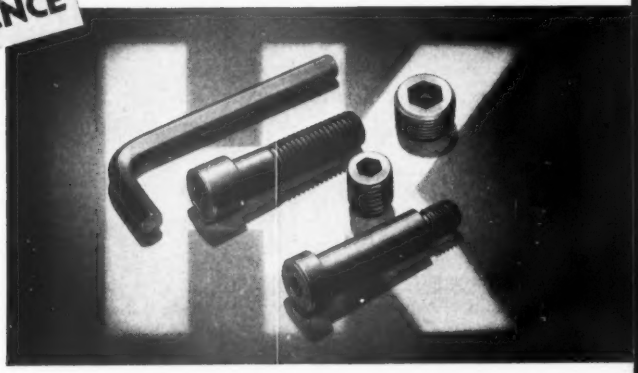

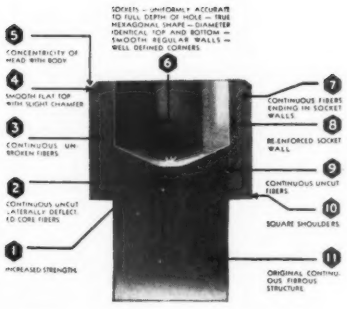
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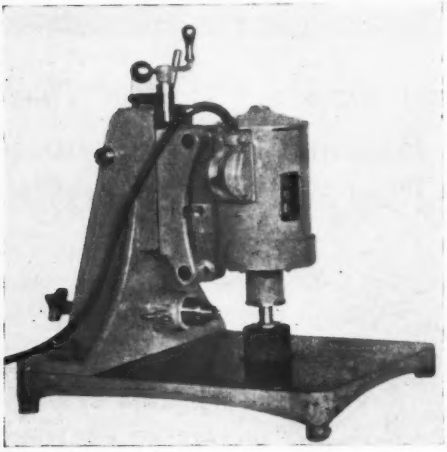

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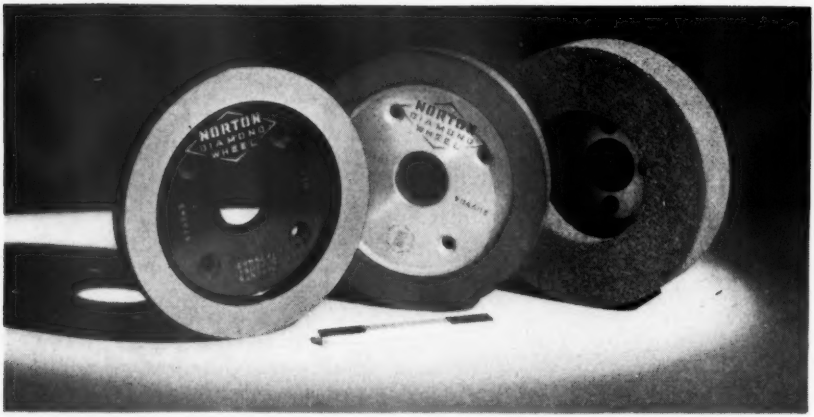

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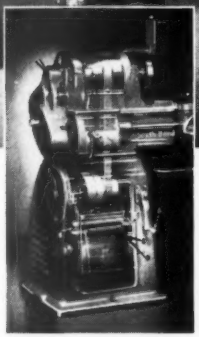

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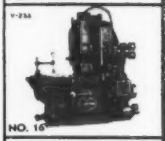
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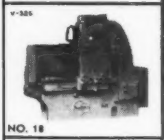
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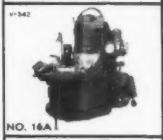
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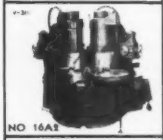
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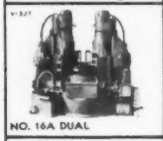
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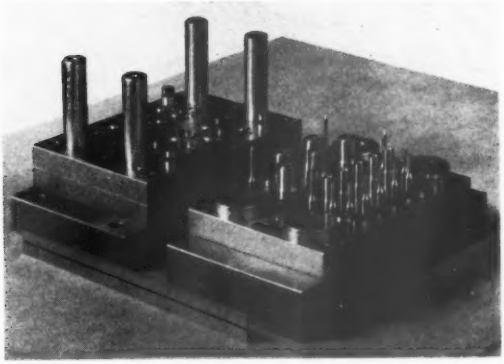

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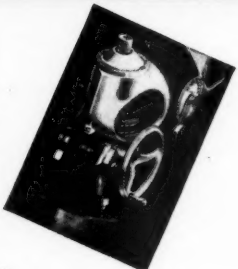

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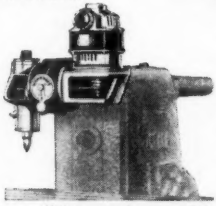

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JANUARY, 1941 Vol. 6, No. 10

Advantages of Standardized Parts in Die Construction

By
GEORGE DANNES

In the series of articles on Die Designing and Estimating which have appeared in The Tool and Die Journal, both design and construction have been considered from the standpoint of almost complete fabrication in the die shop. The exceptions have been die sets, springs, dowel pins and screws. So-called "quick-change" punches, retainers and die buttons of the commercial type have not been described to any extent. These *interchangeable* punch and die assemblies are coming into more and more frequent use because they have numerous advantages to recommend them. Aside from those which are specifically described, they possess the particular advantage of releasing skilled die makers for the strictly "hand and special work" which every die requires. At present, this is of genuine interest to the many die shop owners, tool room superintendents and foremen who are charged with the responsibility for building dies in the shortest possible time. The customary estimating of the time required to machine the parts of and assemble the die used as an example has been omitted, but the complete estimate is available and will be mailed upon request.

—The Editor

As a departure from the types and styles of dies which have been described and illustrated in this publication during the past two years and in which both designing and estimating were given, we will discuss a type of design illustrated by a die of very simple construction. The reason for choosing this die is to introduce a type of construction which has not been discussed previously. The essential parts which make up this die, such as punches, punch retainers and die buttons, are of standard commercial manufacture. The purpose of this article is to compare a typical design using such parts with the more conventional design in which punches are held in one common retainer or punch plate. By a discussion of the relative methods of construction, the time elements and therefore the cost factors can be indicated very clearly.

The use of standard punches, retainers and die buttons is comparable to the use of standardized die sets and other parts. A convincing argument from the standpoint of the die builder should be that such parts are purchased at known prices. Thus, they are included in the cost estimate as known factors. This policy should tend to reduce the hazard of estimating which is frequently a troublesome one. Probably it is a safe deduction also that such standard parts

which are partially or completely made in quantities will cost less than similar parts made singly or in lesser quantity.

The die plate in our design is a machine steel plate into which are press fitted six die buttons. These are a standard commercial product and are finished and ready for mounting. The die plate is mounted on the die shoe which is provided with six slug clearance holes. This completes the lower half of the die.

Individual Retainer Sets

Six individual punch retainer sets are mounted on the punch holder; each set consists of the punch retainer and the backing plate for the punch. These are held in the retainers by various methods which have been developed by several manufacturers. One method is a screwlock, as in this case. Other methods use ball and spring locks, and still other methods are used. However, all of these methods are designed to assure the quick release and removal of the punch. This is a very important factor, particularly in the maintenance and the repair cost of the die during its production life. Compared with the mounting of all punches in one plate, the individual retainer method possesses a great advantage. Let us assume that one of the punches must be removed or replaced on account of breakage. In the case of the common punch plate type it would be necessary to dismount the whole punch holder assembly in order to get at the punch in question and to drive it out of the punch plate. Then a new punch must be fitted into the plate and after the punch plate is remounted to the punch holder, the newly inserted punch usually will have to be aligned with the corresponding die button by either "conking" or peening. It is apparent that this is a time-consuming, wasteful method. On long runs or on punches that have a tendency for any reason to break rather easily, there is a tendency for the dowel pin holes in the punch plate to become enlarged. As this will cause a misalignment of the whole punch plate assembly, sooner or later the entire plate will have to be redoweled.

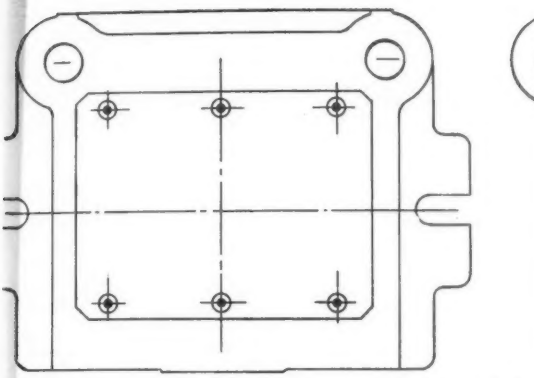
In the case of the individual retainer, the removal and replacement of broken punches is a very simple, easy and quick procedure. The chance of misalignment between punch and button is almost entirely eliminated since the retainer proper will never have to be dismounted. All that is necessary is to release the punch locking device and the punch can be removed and replaced without any difficulty. In some cases, this can be done even without removing the stripper. The saving in time and maintenance cost is apparent. Furthermore, the punches need not be fitted, but can be kept in stock for immediate replacement.

The spring stripper, mounted and suspended from the punch plate with four shoulder screws, performs a double duty —i.e., it holds the part under pressure during the piercing operation and it strips the part off the punch as the punch leaves the die on the upstroke of the press ram. No gages are necessary as the shape of the part is such that it is self-locating.

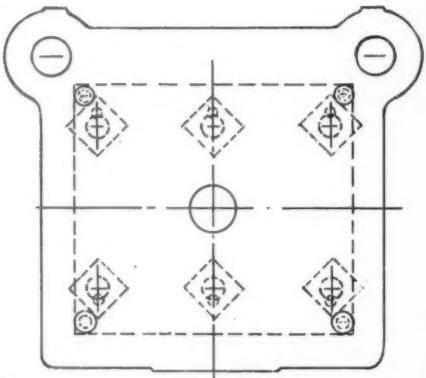
Construction Methods Compared

We can now briefly describe the construction of a die of this type using both methods which will clearly show the difference in time consumption. We begin with the die (6), a piece of 1"x7½"x 9¾" machine steel which is squared on all sides on the shaper. After grinding, top and bottom should "clean up" to the dimensions shown on the drawing. The stripper (4) was also made of machine steel and squared. The die block and stripper being the only pieces which need machining, we can proceed with the actual construction of the die. The die block can now be mounted to the die shoe using four screws and two dowels. We clamp the stripper on top of the die plate. Then we are ready for the jig borer (if such a machine is available) or any accurate drilling machine. We assume, of course, that the holes have been previously laid out on the stripper surface.

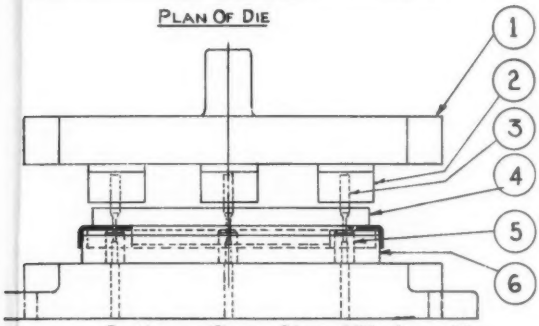
All six holes are drilled through the stripper, die and die shoe, the size of the drill being somewhat larger than the punch size to provide free movement or clearance for the punch in the stripper and clearance for the slugs in the die shoe. The start of the holes should always be made with a center drill to keep the hole in its spotted position. The



PLAN OF DIE



PLAN OF PUNCH



Section on Center Line of Die Assembly

MATERIAL LIST

Det.	Req.	SIZE & MATERIAL	Remarks
1	1	DIE SET (Danly No. 1109-A1)	Std.
2	6	RETAINERS (BSR-Hovis)	Std.
3	6	PUNCHES (B-1 x .177 Hovis)	Std.
4	1	½" x 8" x 9¼" STRIPPER	M.S.
5	6	BUTTON DIES(DB x .181 Hovis)	Std.
6	1	1" x 7½" x 9¾" DIE	M.S.

Pierce Die, showing method of plate mounting with standard parts. Designed by Hovis Screwlock Company, Detroit, Mich.

stripper is now taken off the die plate and counterbored on its top surface to permit part of the punch body to enter the hole freely. The die plate is then taken off the die shoe and the holes opened by reaming a press fit to the die buttons O.D. (Manufacturers of die buttons usually specify the correct size of the hole for a given button.) After remounting the die to the shoe, the buttons are pressed in the holes and the lower part of the die can be considered completed.

The punch holder is set over the leader or guide pins and spaced a distance approximately the height of the retainer and punch assembly away from the die plate. This permits the punch and retainer assembly to be slipped into place, the punch being engaged and centered in the die button. The retainers are located one by one, clamped to the punch holder, which in turn is drilled and tapped for screws. After all retainers are screwed to the punch holder, it is again set over the guide pins of the die set and punch alignment with the holes is checked. When alignment is correct, all screws are tightened, the punch holder is removed from the die shoe and is ready for doweling.

There remains only the operation of suspending and mounting the stripper to the punch holder to make the die ready for tryout and for consequent production.

The solid punch plate type of construction requires additional machining and grinding top and bottom for the punch plate; additional set-up for drilling and reaming of the six holes for the punches; making of the punches; assembling to the punch plate; and most difficult of all, alignment with the buttons. When done accurately and prop-

(Continued on Page 44)

Clamps and Clamping Methods for the Tool Room

By E. G. Marshall

Assistant Superintendent
Pittsburgh Screw and Bolt Corp.
Prebble Avenue Plant

Part One

This month and next month the Marshall series of Practical Tool Design and Tool Making articles presents a study of clamp designs especially selected for their adaptability to so many day-by-day jobs in the tool room. Flat and angular holding clamps, a cam clamp, a group of small shaft clamps and a multiple clamp are shown.

Shop men and apprentices who are following this series will note that the drawing numbers skip No. 24. Fig. 24, a drawing of a standard jig for small parts, with its design and construction detail, had to be omitted due to lack of space. However, this will be sent to any shop man, apprentice or student enrolled in a technical training school upon request accompanied by a self addressed, stamped envelope.

—The Editor

AS every tool room job has to be clamped in some manner, many different and ingenious clamping devices have been designed. Since the commercially built toggle clamp has developed into such a versatile holding device, its use is increasing rapidly but every shop has almost daily need for simple clamps that in some cases can easily be designed and built at the same time the work is designed and built.

A few general clamps, chiefly very simple ones, that are in common use will be described. In some cases both a correct and incorrect construction will be shown to emphasize features of good design.

Fig. 25 is a plain clamp—very simple, yet effective. The clamping member A is a flat piece of cold rolled steel, cut to proper size and slotted to allow it to slide in and out around the stud C. A hardened button B, slightly convex, is placed directly over the center of the support button. If the top surface of the part is uneven or the clamp rocks, the button will still clamp directly over the support. The center screw can be a cap screw or stud as illustrated at C. A stud is preferable because its lower end is screwed permanently in the base avoiding the wear on the tapped hole which the continued action of the cap screw would mean. D is a washer to give the nut added clamping surface. A spring would be desirable for holding the clamp in position while loading or unloading the fixture.

The post E serves two purposes—it acts as a rear support or heel for the clamp and it acts as a guide to bring the button over the support. The designer must be certain, of course, that the clamp can be moved back from the part to give adequate loading space.

Another type of clamp is shown as Fig. 26. It is shown in two views. The left (A) view illustrates several poor design details. For example at C the end of the clamp is off center of the support. If the part being machined is flat this is satisfactory, but if it is a casting and the top side is rough, detail D in the right (B) view is preferable.

The pivot pin at E is too small; the pin at F is preferable and less likely to break. The button at G is more expensive than the button at H without any compensating advantage. The post J of the left view does not completely cover

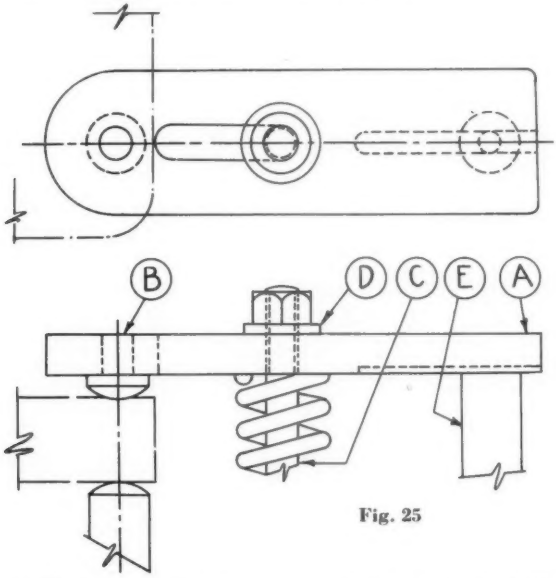


Fig. 25

the pivot pin slot in the clamp, a doubtful economy since the uncovered slot section will clog with dirt and chips. Should the screw M be too weak, a remedy

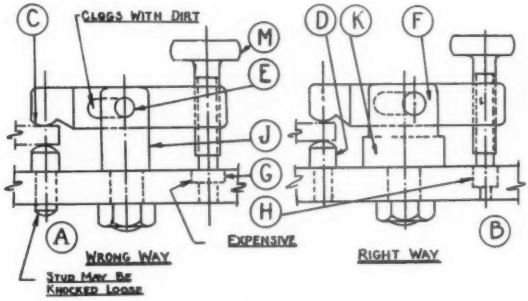


Fig. 26

often successful is to drill a hole through the top and drive a long pin in the hole to act as a handle.

In shops that make machines, such as adding machines and cash registers, that involve a considerable amount of shaft drilling a wide variety of simple clamps are used. Fig. 27 shows five types of clamps to hold small shafts. These are ideas for clamping only and do not show any locating points or drill bushing locations. At A is an eccentric pin which when it is rotated either binds or releases the shaft. To prevent the shaft from a tendency to move endways when the pin is rotated against it, the shaft must be located. A groove is cut in the shaft at B, which by movement of the

pin C allows the shaft to be moved back to permit loading of the jig. The V-block and the eccentric shaft should be tool steel, hardened. The base of the block and the sides of the V are ground after hardening. The fixture has a tendency to work loose in drilling and permit the part being drilled to move. This clamp will not work well if the shaft varies too much in diameter. The clamp is quick acting and reasonably dependable for light drilling work.

ods of clamping the locating blocks to the jig bases. Either heels on two opposite sides for screws and dowels would have to be provided or the screws and dowels would have to come up through the base. The clamp shown at F is a very efficient type, if there is space under the lid for the clamp and screw. The block L should be made of tool steel, hardened and ground. The V is ground parallel with the base. The block M, the clamp N and the screw O can be

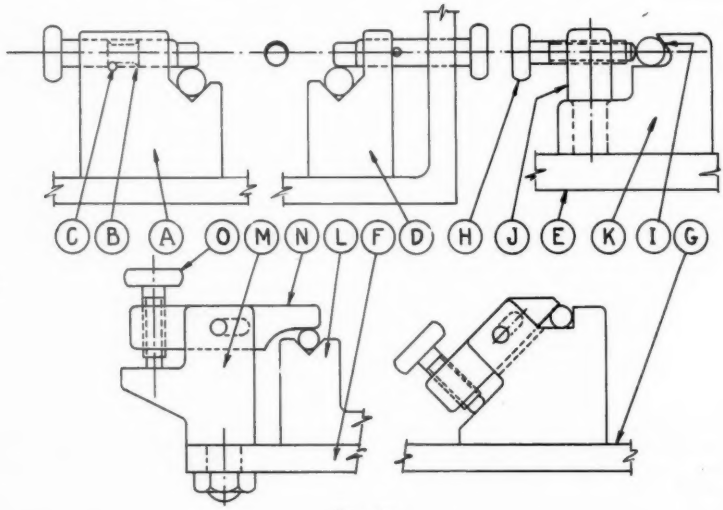


Fig. 27

The type shown at D is very similar to A, except that it has a smaller block and shorter bearing on the eccentric pin. However, this is compensated for by the pin extending out through the wall of the jig, the wall acting as a support bearing.

At E, F and G are three other types of clamps used on round shafts. One disadvantage of E is that the end of the screw H will mark the shaft if it is screwed too tightly. The angle I holds the shaft down on the locating block, in which the stud J is a drive fit. The top of J (can be of cold rolled steel) is tapped to receive the tool steel, hardened screw H. The block K is tool steel, hardened.

All this group of drawings show clamp action only; they do not show the meth-

made of cold rolled steel, cyanide hardened. They should be made of tool steel if the volume of production is very heavy. At G is another excellent clamp, similar to F but with more clearance on top for the lid. If the jigs are used to drill shafts with much variation in diameter, the drill will be central in all sizes at F while at G the drill will move off center with the change in size.

Fig. 28, another clamp similar to Fig. 25, is a quick acting variety. A is the base, usually cast iron. The flat plate clamp B can be made of tool or of mild steel, hardened or left soft, but preferably hardened to prevent bending. A slot in the front end is to clear the bolt C; a bottom slot guides the clamp. The nut K, threaded to hold the bolt C, a snug fit in the base casting, can be

turned to adjust the clamping action. The spring D acts against a washer to raise the clamp when it is not in use. The clamp bolt C is screwed into the nut K and extends up through the clamp

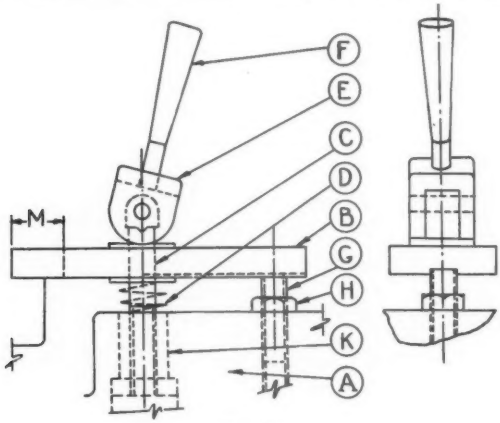


Fig. 28

B and is connected to the cam E with a pin. The cam E, moved by the handle F, is designed to raise the clamp free of the work when the handle is down flat and to depress the clamp holding the work when the handle is raised. The screw C should be as close to the work as practicable. The position of C is regulated by the dimension M from the slot to the edge of the clamp, plus the clearance allowed between the clamp in its open position and the work. The distance from the point the clamp touches the work to the center of C should be shorter than the distance between C and G, so that by simple leverage the point

nearest the clamp screw gets the largest share of the holding force. The screw G with the lock nut H serves a dual purpose—it adjusts the position of the clamp and acts as a rear post or heel for the clamp.

Clamps with Clearance for Profiling Milling Cutter

Another type of clamping method, that while not as effective as the flat clamp, will hold the work and leave adequate clearance over the work for a jig lid or profiling milling cutter, is shown at Fig. 29. Two similar styles are shown, in both A is the cast base and B is a hardened tool steel button to support and locate the work. The clamp C in this case is made of tool steel, hardened, to hold the sharp corner that contacts the work. This point of the clamp travels

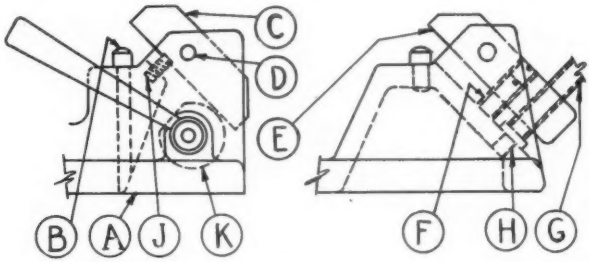


Fig. 29

in an arc pivoting on the pin D. The face of the clamp E (right) exerts a downward pressure on the work as well as an outward thrust. The screw F prevents the clamp from moving too far from the work. The clamping work is actually done by the screw and hand knob G. To prevent the end from mushrooming the screw should be cyanide hardened. To obtain the necessary leverage the screw G should be farther from the pin D than the working point of the clamp. The tool steel button H is a wear point to save the casting. The left clamp operates similarly except it is designed for faster operation. The spring J is used to move the clamp away from the work. The cam K operates the clamp; turning the cam handle to the right opens the clamp, turning left clamps the work. If the jig has a heavy production schedule the cam should be made of tool steel, hardened.

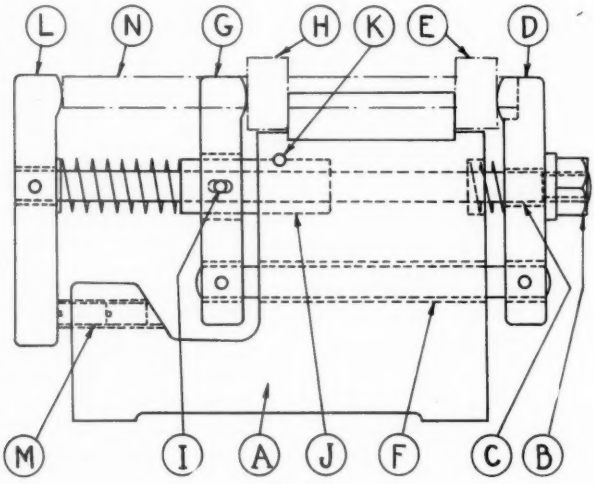


Fig. 30

Fig. 30 is a drawing of a series of clamps operated by one nut. Two clamps hold arms against a locating block and another clamps the shaft in position. The nut B is tapped to fit the long screw C. In operation the arms are assembled on the shaft and placed loosely in the jig. The nut is turned and as it tightens, it first contacts clamp D, which in turn moves in until the top contacts the arm E. The top then stops moving and continued turning of the knob causes the bottom end to move in till the shaft F is pinned to the bottom ends of clamps D and G. The lower end of clamp D through shaft F transmits the movement to the lower end of clamp G which moves out. As G is pivoted on pin I the upper end moves in and clamps the arm H against the locating block. The pin I is a drive fit in the clamp and a bearing fit in the bushing J. A slot cut in shaft C clears pin I. The bushing J is fastened to the casting by pin K. Up to this point both clamps D and G are in their holding or locked positions. Continued turning of nut B draws on the screw C which draws in clamp L, the lower end of which limits against the screw M. The top of clamp L tightens against shaft N. The shaft end limits in the slot in clamp D, which positions the end of the shaft from the arms. The clamps and shafts can be made of cold rolled steel, cyanide hardened. In case of heavy production, the clamp can be made of tool steel and hardened. In assembling shafts for adding machines, for example, as many as six clamps are used with one knob.

(To be continued in the next issue)

DoAll STEPS UP PRODUCTION

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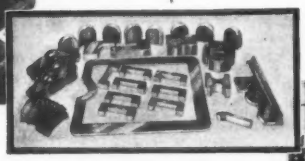

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PLASTIC MOLD DESIGNING

By GORDON B. THAYER

Plastic Design Engineer
General Industries Company

Article XI of a Series

Methods of Mold-Sinking

Milling (Cont'd), Duplicating

THE general run of plastic mold milling is done with end mills, operated from a vertical head. There is not much need for circular milling cutters as used on the horizontal arbor, since the machining involved is concerned with following contours. Standard end mills are purchased, and many special shapes are made to requirements by the toolmaker. The simplest of these special shapes are made of drill rod as shown in Fig. 22. Cutter A is ground to shape, and then is cut away to the center line which makes a flat cutter with a single cutting edge. Cutter B is a safety edge cutter which is used to mill a shoulder or step that must be parallel to a contour already established. The shank diameter is greater than the cutting diameter by an amount equal to twice the step dimension. The shank follows the old contour and the cutting edge makes the new one. Other milling cutters are made similar in shape to T-slot cutters with special shaped teeth.

Small corner radii are expensive to mill in a cavity, especially if the cavity is deep. The cutter diameter can be only twice the radius desired, and small cutters cannot cut very fast or they will break. Sometimes it is better to mill up to a corner with a fairly large cutter, and then finish by filing. In this case, a master template is sometimes made to be tapped in lightly to show a mark on the material which is to be filled out. In this manner, it is possible to make the corner straight and avoid undercutting.

In milling a cavity with deep steps it is convenient to make it in sections as illustrated in Fig. 23. In this manner, it is easy to get the steel out where it can be reached conveniently. The steps in this cavity may be milled with a safety edge cutter, and the insert block is filed to fit the chase. The assembly must be well fitted or the material will run down into the cracks. There will be flash at these assembly joints, but it will be thin and easy to remove if the fit of the parts is close. They should not, however, be forced in an assembly of this type, as it is often necessary to disassemble the cavity parts for polishing or repairing, and if the fit is too tight the side walls will be scored.

When a number of cavities are to be turned, a form tool may be made. This may be a simple single point tool held in the tool holder, or it may be a three or four fluted cutter held in the tail

stock. The number of cavities to be made does not always dictate the use of a form tool, sometimes the contour itself is sufficiently complicated to warrant the use for only one cavity. Such tools are always kept in case a new cavity is required to replace a broken one.

Duplicating

The duplicator is a regular high-speed vertical spindle milling machine equipped with a duplicate table and tracer head. The master, or model is mounted on the auxiliary or duplicator table which can be moved horizontally in any direction.

The horizontal movements of the table and the vertical movements of the cutter and tracer spindles accomplish the duplication. Any irregular shape in three dimensions may be duplicated and models or templates are used as masters. A solid model may be used, and milling will be done in horizontal and vertical dimensions. Or a template may be used either in the horizontal or in the vertical plane. Fig. 24 shows a cavity being duplicated from a solid model. Fig. 25 shows a contour being milled from a template in the horizontal plane.

An advantage of the duplicator is that a model can be reproduced exactly as the sculptor intended it to be, without approximations which would be required in hand engraving or milling machine work. Many shapes are much too involved to be milled practically. In case more than one cavity is required, only

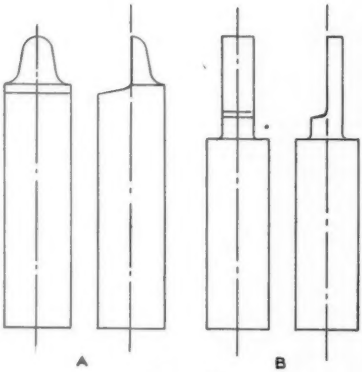

Fig. 22

A—A formed cutter made of drill rod and ground away to the center line to make a cutting edge.

B—A safety edge cutter for milling a new profile which must be parallel to another step already established.

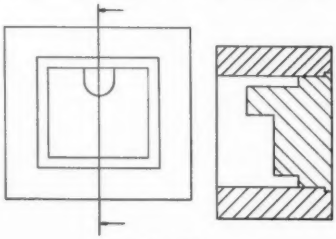

Fig. 23

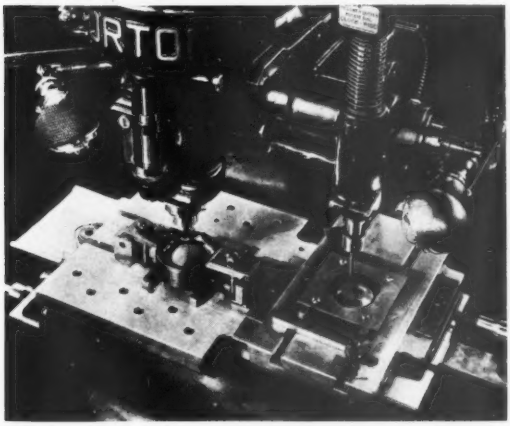

Fig. 23 Sectional construction of a deep cavity simplifies milling.

Fig. 24 (left) shows the production of a bottom plate mold for a glass bottle from a master template. This is a relatively simple mold, the master of which is easily made. The duplicator can be used for more complex molds just as simply.

the duplicator or a hob can make multiple cavities alike. When the projected area of the hob becomes large, the size of hobbing press becomes too great for practical use because the ordinary run of mold work is at present in the smaller size casting classification, and a large hobbing press is not economical for every shop to have. When it is not convenient to mill or duplicate on account of inaccessibility, a hob may be duplicated from a positive model. This, of course, assumes the nature of the casting is such that shrinkage allowance and hob run-away will not matter a great deal. When shrinkage is of importance, that is, when a relatively large casting is to be duplicated from a model, and must fit mating parts, the model should allow for shrinkage, or the mating metal parts should be made to fit the casting after it comes from the finished mold.

areas of the plaster cavity with steel templates. The toolmaker makes a template of the contour of the model at the parting plane, which can be fitted directly to the model. This template is used to form the bottom of the flask for the plaster cast. It is fitted with dowel pins which extend into the plaster. In use, the template protects the parting line contour from damage and wear of the tracer or stylus, and thus insures a good match for the cavity halves. Sometimes steel inserts may be used in a cast when true sharp lines are desired and where the edges of the plaster might be broken or chipped in use or in removing the model. Plaster models are usually given about 24 hours to set before removing the pattern. If the mixing is properly done, the finish of the plaster cavity will be as smooth as the surface of the model used and will be free from

Fig. 25

Milling dove-tail slots in Dow-metal shoe last on a duplicator. The follower beside the cutter regulates depth; lateral movement is controlled by steel template (right). Special fixtures, adjustable for all size lasts, hold work and master.

Depth of cut is ¼″ using 7-degree angle single lip cutter ⅜″ wide at base and 6000 rpm spindle speed.

(Photos courtesy George Gorton Machine Co.)

When a cavity is to be duplicated from a model of the casting, a plaster cast of the cavity is made from the model. Special hydraulic cements are available for making plaster models. These cements work like plaster of Paris, and some experience is necessary in order to get the mixture of cement and water of exactly the right consistency. It is good practice to reinforce the important pits caused by air bubbles in the wet plaster.

After a cavity or force has been machined on a duplicator, the finish may be somewhat rough because of the inability of the cutting tool to conform exactly to the contour of the model, and from cutting in several directions.

This roughness may be removed by a

(Continued on Page 44)

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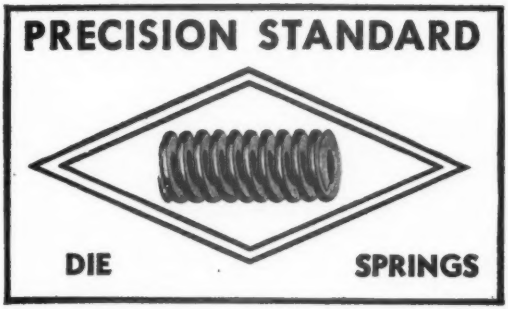

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A Reader Requested Article

Nomenclature of Modern Projectiles

By William Reiff, Jr.
Cleveland Duplex Machinery Company

The National Defense Program is already reaching into Manufacturing Plants and Tool and Die Shops where many of us are being confronted with unfamiliar products' and parts' names and expressions. They constitute a part of "war's" industrial vocabulary and for the man whose business activities normally are in the fields of peacetime products (and in our country that means most of us) such terms as "ogive" and "boat tail" are unfamiliar to say the least.

It should be helpful, therefore, to have the official nomenclature as it relates to the shells which we are to manufacture. The names and definitions which follow have been gathered from sources which are authentic although of necessity they are as brief as is consistent with conveying correct understanding. It is hoped that they will be helpful to your readers. —*The Author*

MODERN PROJECTILES

SHOT: *(Steel)*

A—**Thick Walls, Small Cavity**—penetrates target and bursts.

B—**With Armor Piercing Caps**—shorter than a *shell* of same caliber, but will penetrate a greater thickness of armor.

SHELLS: *(Projectiles)*--**Thin Walls, Large Cavity**—with following components:

A—**Body**—a cylindrical form with following nomenclature:

1—*Body*—Bourrelet to band.
2—*Bourrelet*—Forward bearing surface to keep projectile centered in bore, 1/6 caliber in width.
3—*Band Groove*
4—*(Head or Nose)*—Forward of Bourrelet.
5—*Boat Tail*—Rear of band, decreases air resistance and steadies projectile in late flight when velocity is low.
6—*Cavity*—Interior of shell, contains explosive bursting charge or other load.
7—*Ogive*—Struck from center line perpendicular to the axis of the projectile with a radius to 2 calibers. (On later shells increased to 9 calibers giving greater range.) New long points decrease

(Continued on Page 30)

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Grinding INSIDE CONTOURS with the LOWER SPINDLE. One of the frequent and difficult jobs for which the machine was designed.

Grinding INSIDE CONTOURS with UPPER SPINDLE. This operation is best performed with spindle operated from above.

Grinding OUTSIDE CONTOURS with LOWER SPINDLE. Note the small external radii requiring the use of small wheel.

Grinding OUTSIDE CONTOUR with UPPER SPINDLE. This permits getting at surfaces not accessible from below with standard height wheels.

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Nomenclature of Modern Projectiles

(Continued from Page 28)

air resistance at beginning of flight when velocity is high.

B—Cavity Closure—adapter which carries the fuze.

C—Rotating Band—*(Gilding Metal)*
90% Copper, 10% Zinc.
Lands in bore of gun cut thru soft metal causing rotation of projectile.
Width of band—1/6 to 1/3 of a caliber.

D—Load—contained in cavity—material used to fill depends on use of shell; the following list shows type of shell and material used:

1—*Gas Shell*—Contains enough explosive to burst shell to free gas.

2—*Incendiary* — Filled with phosphorus, thermit, etc., to produce heat and flame for fire-starting purpose.

3—*Illuminating*—Used to illuminate objective. A time fuze releases a flare which is suspended by a parachute.

4—*Smoke Shell*—Produces smoke on impact or in the air for spotting bursts of gas shell or for smoke screen.

5—*Tracer*—Marks trajectory by smoke and flame during flight. Tracer element is furnished separate for large calibers and used when needed for fire adjustment and target location.

6—*Semi-Steel* — High quality casting, inferior to steel shell in strength and capacity for carrying explosive. Used for high explosive and gas shells.

7—*Armor Piercing* — For piercing heavy armor plate and deck plate. Usually written A.P.

8—*High Explosive*—Used for destructive purposes for fortifications, etc. Point fuze on small caliber and base fuze on large caliber, replacing shrapnel as high explosive, shatters thin wall for destruction of personnel. Usually abbreviated H.E.

9—*Shrapnel*—A time fuzed shell with thin walls loaded with 1/2" balls of lead and antimony. The shell does not burst but discharges thru the nose at the predetermined time. Propelling charge for balls is in base and is ignited from tube thru center of shell from fuze in the nose.

Nomenclature of Fuzes and Primers will appear next month. These and succeeding installments have been selected to give tool room and die shop men a better understanding of National Defense Work.

Defense Program Notes

Defense Functions and Activities

The National Defense Advisory Commission has issued a 16-page booklet, "Functions and Activities", which describes the duties of the Commission and is a summary of the activities up to the end of the year.

The pamphlet answers a number of the most frequently asked questions regarding the work of the Commission and the part it is playing in the National Defense Program. One section gives a division-by-division summary of the Commission's activities since its establishment in May 1940, with a breakdown of the major contract classifications and the amounts of each of the major defense items contracted for, and present deliveries on these items.

Army Purchasing Offices

A directory of Procurement District Offices, including all the arms and services, is available to shop men who wish to keep in touch with contracts and sub-contracts on which they are qualified to bid or negotiate. The directory is available from the Planning Branch, office of the Assistant Secretary of War, Washington, D. C.

"Selling to the Navy"

All essential information required to enable shops and departments to be placed on proper mailing lists to receive bid invitations on types of naval equipment for which such shops have facilities, is contained in a 32-page booklet, "Selling to the Navy". The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will send copies on request.

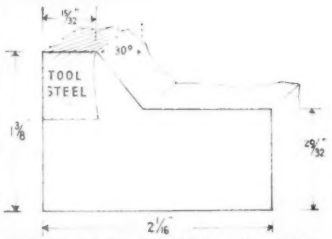
Northern Ohio Division Plans Party

The Northern Ohio Division, Special Tool, Die and Machine Shop Institute, will hold their Fourth Annual Dinner Dance on Saturday, March 8th, in the Empire Room of the Hotel Cleveland, Cleveland. A floor show is scheduled as part of the entertainment. Members of the industry and visiting members of other divisions are particularly invited to attend. E. T. Hahn, secretary-treasurer, and J. R. Fitzsimmons, entertainment chairmen, are in charge.

SAVE 28% to 47% ON YOUR SECTIONAL DIES

with JESSOP ROLLED COMPOSITE DIE SECTIONS

Because they are rolled to shape, JESSOP Composite Die Sections save from 28% to 47% in original purchase weight, as compared to rectangular sections. Likewise, less machining is necessary. Percentage savings depend upon the sections—eight different sections being carried in stock. Write today for FREE copy of our handy wall chart which illustrates and lists specifications for eight standard shapes of JESSOP Rolled Composite Die Sections. Address JESSOP STEEL CO., 610 Green St., Washington, Pa.



JESSOP Rolled Composite Die Section "D", developed especially for making smaller dies. Seven other shapes are available for making large sectional dies.

JESSOP STEEL CO. FINE JESSOP STEELS WASHINGTON PA. EST. 1901

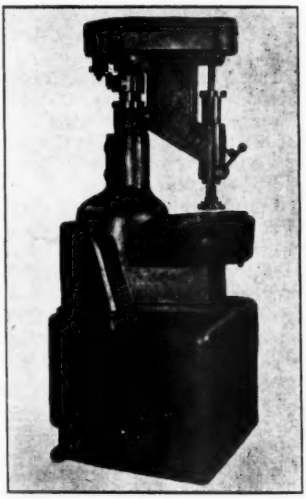
Jessop Steels of America

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · and COMPOSITE STEELS

Ultra-Lap Machine Reproduces Hand Lapping Motion to Produce Optical Flatness

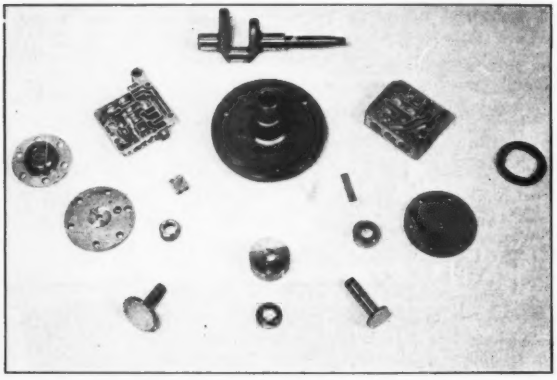
THE Ultra-Lap principle of surface finishing, developed and perfected in the refrigeration industry, is now offered to the tool and die industry for the first time. The Ultra-Lap Machine can be used to produce any number of surfaces with almost identical characteristics of flatness and smoothness. For many years it has been necessary to hand lap wherever a really fine flat surface has been desired. The Ultra-Lap Machine mechanically reproduces the motion most used in hand lapping and produces a finish without having lapping marks which are either concentric or all running in the same direction.

It is well understood that it takes a combination of three motions to produce flatness of any great accuracy and to insure the correction of any surface deformities. Due to the multiplicity of motions, the light pressures involved, and the type and quantity of abrasive used, it has been definitely proven that any material or combination of materials may be lapped without danger of loading abrasive material into the finished surface. Samples of various materials such as steel, cast iron, leaded bronze, aluminum, copper, die cast alloys and morganite have been tested under polarized light after having been finished the Ultra-Lap way without revealing any trace of abrasives in the finished surfaces.



The machine itself is very easy to operate and is so constructed as to be practically fool proof in operation and is also constructed ruggedly enough to warrant its standing up under continuous operation. The lapping pressure is light enough to guarantee the removal of all amorphous metal imparting the finish that is durable and of almost perfect bearing contact over the entire area.

The lapping plates stand up for a remarkable number of surfaces before needing reconditioning and the reconditioning of these plates has been so simplified that they can easily be put back in operating shape. The machine works the piece over the lap so uniformly that it is necessary to remachine the face only if the plates are carelessly damaged on the face.



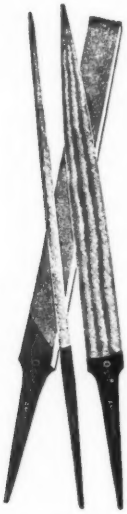
Today these machines are operating to limits of under one (1) light band (.000012 of an inch) for flatness and smoothness to 2 micro-inch R.M. 5 or under.

For further information, write Ultra-Lap Machine Co., 247 McDougall Ave., Detroit, Mich.

ONLY THE BEST ARE GOOD ENOUGH
FILES TRADE TOOLS MARK

Swiss-Pattern Files
Made in U. S. A.

For the most delicate or accurate filing job



Whatever your precision filing jobs may be, you are sure to find a suitable selection in the large "American Swiss" line of more than 3000 different shapes, cuts, and sizes of Swiss-Pattern files.

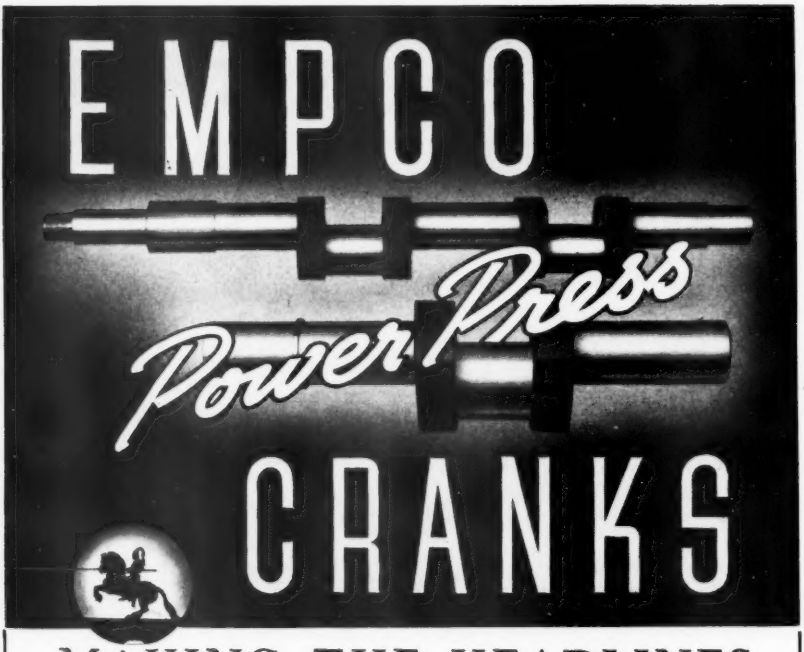
These precision tools are made by long-experienced, skilled specialists in a plant devoted exclusively to their manufacture. Every manufacturing process is controlled to close tolerances, and each file is individually inspected before packing.

Buy from our Distributor

American Swiss File & Tool Co., Elizabeth, N. J.

American Swiss

Files of Precision



MAKING THE HEADLINES

Five Years Ago: The **FIRST EMPCO STEEL CRANKSHAFT** was **INSTALLED** in a Power Press doing extra heavy duty. Performance records show that this crank lasted more than three times longer than the average service life of standard carbon steel cranks previously used on the same press for the same work.

Since: Hundreds of **EMPCO** Crankshafts have been made for dozens of makes and sizes of presses; every one has given satisfactory service through tough production schedules.

Today: **PRESS REPAIR MEN SPECIFY EMPCO STEEL FOR CRANKSHAFTS**, because they have learned that **EMPCO** Crankshafts need less frequent replacement. They say **EMPCO** cranks will only bend where most cranks break. Bent crankshafts of **EMPCO** steel are easily straightened.

We Solicit your Inquiries

ENTERPRISE Machine Parts CORP.

2731 Jerome Ave. **Detroit, Michigan**

Manufacturers of Single Purpose Machines
Tools - Fixtures - Replacement Parts

IS THERE A DOCTOR IN THE HOUSE ?

Yes, Sir! Graphitic Steel is the doctor for your tool and die ailments. It's unexcelled for its ability to resist abrasion and wear.

There are five grades of Graphitic Steel—Graph-Al, Graph-M.N.S., Graph-Mo, Graph-Sil and Graph-Tung. They can be worked into any shapes or sizes and respond readily to heat treatment. They have the free machining qualities of cast iron and the high strength of steel.

Let us tell you more about this money-saving, time-saving new steel. Consult us without obligation.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division

TIMKEN
ALLOY STEELS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

DoAll Announces New Precision Surface Grinder

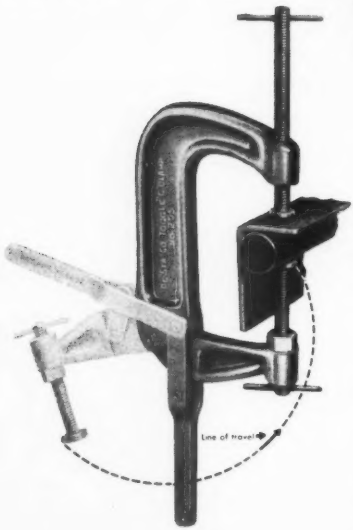
THE DoAll Company announces a new Precision Surface Grinder designed for both tool room and production work. Its appearance is particularly timely because of the present demand for such a basic machine. The design, after two and a half years spent in development, has been carefully worked out to give maximum rigidity and minimum vibration. The base of the machine is scientifically ribbed and reinforced giving a full box construction. The alloyed cast iron column of the machine is true box construction with a 30" bearing surface in the base which holds it rigidly in any position. The table is also made of alloyed cast iron. All way sliding surfaces are carefully hand scraped to insure perfect accuracy and long wear.

The wheel spindle, equipped with precision ball bearings, is direct motor driven by special dynamically and statically balanced motor. Spindle is supplied to use standard 7½" diameter by ½" face wheel. Table movements both longitudinal and cross are hydraulically driven, insuring smooth operation. Simplified controls make operation of this grinder extremely easy.

A built-in dial indicator registering in tenths auguments hand wheel feed, en-

(Continued on next Page)

NEW "C" CLAMP
With Quick Acting TOGGLE MOVEMENT



Combines all advantages of the old style "C" clamp plus swift toggle action. When released, entire lower half of clamp swings clear of the work.

Two adjustable rods permit holding work at exactly the desired spot. Will hold many types of work not possible with ordinary "C" clamps.

Made in 6" size only. Withstands clamping pressure of over one thousand pounds.

TWO MODELS:—No. 255 has screw type, threaded rods; No. 256 holding rods are ½" standard, smooth rods, for use in arc welding where sparks might otherwise damage the threads on the screw type rods.

PRICES:—$5.00 per clamp, f. o. b. Detroit. Unless otherwise requested, Clamp No. 255 (threaded holding rods) will be shipped. Write for price on lots of twelve or more clamps. Mail your order direct to:

DETROIT STAMPING CO.
344 Midland Ave., DETROIT, MICH.

(Continued from Previous Page)

abling the operator to grind to extremely close limits. The indicator is coupled directly between the wheel head and table thus giving a direct reading of any movement of the grinding wheel relative to the work being ground.

The table travel is infinitely variable from zero to 50 F.P.M. Cross feed is variable from zero to 150 thousandths at each reversal of table travel. Automatic cross feed movement is provided for wheel dressing. A novel built-in cold fluorescent type lamp provides a soft illumination to the table.

Forced feed filtered oil provides automatic lubrication to all moving parts. Coolant piping, splash guards and coolant return systems are standard equipment on the machine. It is only necessary to couple a coolant pump unit direct to the pipe line for wet grinding operation. The coolant splash guards are readily removed for dry grinding.

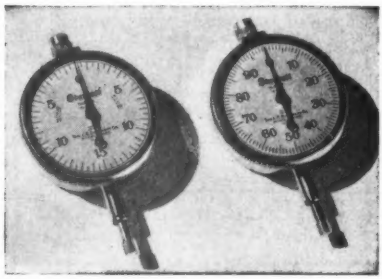
The same basic machine designed for tool room use and designated as Model GS Tool Room Surface Grinder is also available. This machine is built for dry grinding operation only. It is not automatic in operation; work can be ground up to 9″ by 18″ in size.

For full information on the DoAll Precision Surface Grinder or the Model GS Tool Room Surface Grinder, call in your DoAll man or write Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis, Minn.

A Survey of the Plastics Industry

The Institute of Plastics Research, sponsored by Modern Plastics magazine, gives in a 52-page booklet the first comprehensive analysis of plastics as a market for American Industry. Complete with many graphs, charts and statistics of the plants and mold making equipment, both the productive and consumptive capacity of the plastics industry is surveyed. A history of plastics and their uses by Dr. Gordon M. Kline is included.

The booklet is an excellent introduction both for the technical man and for the manufacturer of equipment who wishes to sell to the plastics industry.



STARRETT

DIAL INDICATORS

The wide choice of models, types and dial calibrations lets you pick the one best Starrett Dial Indicator for any production measuring, testing or indicating operation. Write for Starrett Dial Indicator Catalog "D.M."

THE L. S. STARRETT CO.

WORLD'S GREATEST TOOLMAKERS

Precision Tools...Dial Indicators...Ground Flat Stock
Hacksaws...Metal Cutting Bandsaws...Steel Tapes

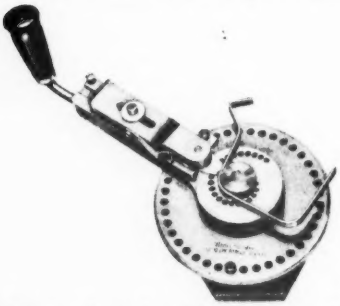
ATHOL, MASSACHUSETTS, U.S.A.

Standardize on

BUY THROUGH YOUR DISTRIBUTOR

Micro Die Duplicating Bender for Bench or Vise Contour Bending

THE Micro Die Duplicating Bender, a basic bending machine, duplicates many varieties of metal pieces and for



classes of work within its capacity is a substitute for blanking or forming dies. The range of contour bending and die duplicating operations is said to be only limited by the expansion and contraction limits of the material being formed. The Micro Die Duplicating Bender, without alteration to its design, will receive simple conversions for forming angle, channel, rod, round or square tube, round, square, half-round or flat wire and strip stock (on edge and vertically) and any other ductile material, with a minimum set-up time.

Conversions are quickly made from regular stock materials with a simple turning lathe and hand tools, in fact many can be made without a lathe. Conversions can be changed rapidly from one set-up to another and back to any initial conversion with die duplicating operations—held to tolerances not to exceed .001". The hexagon base permits six positions for vise operation. Automatic nose opens automatically for receiving and delivering material rapidly for semi-production work. Material can be cut to exact length before forming, saving the usual waste and loss involved in trimming after forming. All contact parts are of accurately hardened and tempered, heat treated steel.

Circular TJ, "Metal Duplicating Without Dies", with specifications and prices, will be sent on request. Write O'Neil-Irwin Mfg. Co., 316 8th Ave., So., Minneapolis, Minn.

Cut Pot-Hardening and Melting Costs *with this Big, New* JOHNSON Furnace No. 570

Specially designed for economical salt, cyanide and lead-hardening. Efficient for tool and die makers for case-hardening, and for pattern and model makers for melting aluminum, brass and nickel-silver. With steel pot, 14"x20" diameter. $199.50, F.O.B. Factory.

Send Your Specifications for Quotation
CLIP AND MAIL TODAY

D
Send me full free information on Johnson Furnace No. 570.
Name _____
Address _____
City _____ State _____

JOHNSON GAS APPLIANCE Co.
Cedar Rapids IOWA

611 E Ave., N.W. 1941 Our 40th Year

Strongly constructed shields, heavily lined with insulating refractory.

Due to the large combustion space below and around the pot, the flame does not impinge directly against it.

Boice-Crane Announces New 14" Band Saw

BOICE-CRANE Company, Toledo, O., announces the No. 2300 Hi-Speed 14" Band Saw, a distinct advance in design and offering, according to the manufacturer, three distinct advantages: (1) It cuts 2 to 4 times faster than similar machines of the same and larger sizes; (2) It cuts at least twice as smooth on wood and fiber materials; (3) A new welded steel frame gives this machine a new standard of rigidity not equal in any machine of similar or even larger size.

Operating with light weight, pressure molded Bakelite wheels, the manufacturer states that this is the first application of plastics to a major part of a wood-working machine of this type. These wheels can be operated at higher speeds than generally used on machines of this type, giving faster cutting rates and smoother cuts.

Single speed 1200 r.p.m. models with direct connected motors are available in both bench and floor types. There is also a V-belt drive bench model and a fourth model designed especially for the metal working trade, which comes equipped with selective speed gear box drive giving 8 speeds—1120, 890, 660, 450, 70, 50, 35, and 25 r.p.m.'s for cutting wood, fiber, metal, plastics, resins, celluloid, cloth, paper, and many other materials.

A new 8-page bulletin will be sent on request. Write Boice-Crane Company, 930 W. Central Ave., Toledo, O.

Dayton Institute Group to Hold Seventh Annual Dinner Dance

Harry C. Moore, committee chairman of Tool Manufacturers' Association, Inc., affiliated with Special Tool, Die and Machine Shop Institute, announces the Seventh Annual Dinner Dance and Entertainment to be held in the Ball Room, Hotel Biltmore, Dayton, Ohio, Saturday, February 8th. The attendance mark set last year is expected to be exceeded. Members of the Board of Trustees include G. L. Capliski, president-treasurer, The Eureka Tool & Die Co.; J. F. Deibel, vice-president, Modern Tool, Die & Machine Co., Columbus, O.; W. M. Haben, Norwood Engineering Co.; J. J. Kohl,

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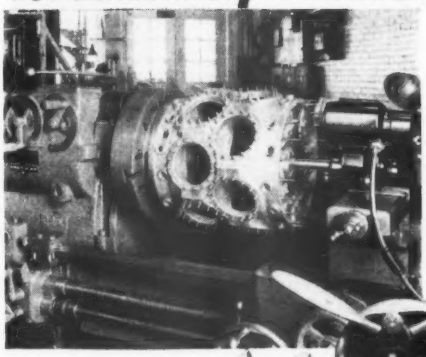
Uncanny Accuracy



Precision Personified!

Accuracy in action! A Dumore No. 7 grinds the bearing liners in the main crankcase of a Pratt and Whitney Twin Wasp Engine.

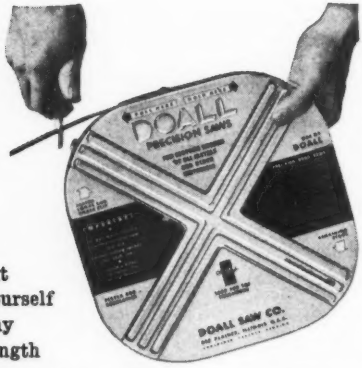
Through more than a quarter-century of precision tool manufacturing experience Dumore has developed grinders of uncanny accuracy for the widest imaginable variety of applications. Your Dumore distributor will show you how you can reduce your labor, spoilage, and overhead. Feel free to call on him . . . there's no obligation.

While air hostesses popularize air travel . . . Dumore grinders bring mechanical perfection that greatly increases safety.

(TWA Photo)

Dumore PRECISION Grinders

THE DUMORE CO., Dept. 371-A, Racine, Wis.



Cut Yourself Any Length

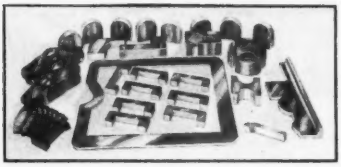
DoALL BAND SAWS

Now in Special Metal Boxes

Just what band saw users have been asking for—a modern, compact, convenient way to stock saws. Safe to handle, easy to get at. Window shows how much saw remains in box.

DoAll Saws last twice as long because of their high tensile strength. Originally developed for the DoAll Contour Machine, but most of the widths are also adaptable to metal cutting band saws.

FOR REALLY TOUGH JOBS



A group of special parts made at Ingersoll Milling Machine Co., Rockford, Ill. Tool steel was cut at the rate of 1½ square inches per minute, cast iron 3½ square inches. This is typical of the kind of work DoAll Saws do faster and better on all metals including cold rolled nickel, ductile aluminum alloy, laminated low carbon steel sheets, neoprene, etc.

FREE TEST

Send your difficult metal cutting job to our Testing Laboratory for experiment.

Send for booklet *Actual Performance Records of DoAll Saws.*

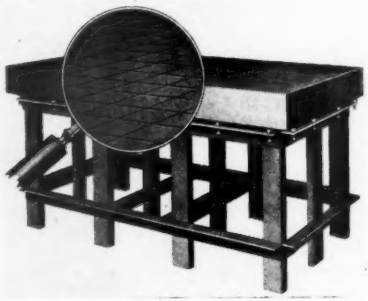
THE DOALL CO., Inc.
1203 Thacker St., Des Plaines, Ill.

DO SAWS L

Challenge Machinery Offers Semi-Steel Lapping Plate

TO provide a means for accurate lapping of delicate joints, The Challenge Machinery Co., Grand Haven, Mich., has designed a semi-steel lapping plate which has $\frac{1}{16}$" grooves, spaced ½", running the full length and width of the surface. This plate is specifically designed to assure a perfect fit when lapping in metal to metal joints on which no gaskets, shellac, or sealer of any kind are used. With it joints required to hold oil can be properly lapped.

Challenge semi-steel lapping plates are made of high grade semi-steel, specially heat treated and machined. They are used on crank cases, cylinder heads, end bells, gear housings, and other parts that must be perfectly lapped to avoid oil leaks.



A specially designed all-steel stand is available with these lapping plates. It is arc-welded for rigidity and strength and is equipped with closely spaced lock leveling screws that enable the user to keep the lapping plate level at all times.

Challenge semi-steel lapping plates are built in a wide variety of standard sizes, ranging from 8" x 8" to 52" x 144". Special sizes are built to order.

For details and prices on Challenge Semi-Steel Lapping Plates write The Challenge Machinery Co., Grand Haven, Mich.

Dayton Group to Hold Dinner Dance

(Continued from Page 39)

The International Tool Co.; and H. C. Moore, The Moore-Eastwood & Co. Tickets may be secured from Secretary H. L. Neilson, 1324 Grand Ave., Dayton, O.

Fenn College Offers Tool and Die Designing Courses

W. N. DELENK, consulting tool engineer and head, department of Tool Engineering of Fenn College, Cleveland, in calling us to task for listing only one course in Machine Design in the list published in our October issue (page 30) states that the Technical Institute of Fenn College is the only school in the country offering a complete and practical four-year course each in: (1) Tool Designing; (2) Die Designing; and (3) Tool Engineering.

The complete program is as follows:

TOOL DESIGN	I: Cutting Tools
TOOL DESIGN	II: Gages
TOOL DESIGN	III: Manual Tools
TOOL DESIGN	IV: Jigs
TOOL DESIGN	VI: Fixtures
TOOL DESIGN	V: Turret Lathe Tools
TOOL DESIGN	VII: Automatic Tools

(Continued on Next Page)

New Convenient Containers for Dayton Rogers Layout Fluid

New improved containers designed to meet various trade demands have been announced by Dayton Rogers Manufacturing Co. of Minneapolis, Minn. The Layout Fluid is now available in the following packages: a four-ounce combination brush-in-can for individual use, one pint, one quart, one gallon cans for stock room use and in five-gallon drums.

The Dayton Rogers Layout Fluid provides a dark background making the described lines stand out by definite contrast—relieving eye strain and making accurate work easier. It can be used to advantage in layout work on brass, aluminum, stainless steel, copper, tin, etc., as well as the iron and steel alloys. With this die-blue Layout Fluid, it is not necessary to polish the surface for application. It can be brushed on freely and dries instantly.

A sample of Dayton Rogers Layout Fluid will be sent on request. Write Dayton Rogers Mfg. Co., 2821 13th Ave., S., Minneapolis, Minn.

These cam clamps combine fast action and low cost of a standard toggle clamp with the tremendous holding power and the variations of a cam movement.

KNU-VISE CLAMPS are standard equipment with 95% of the aircraft, automobile and accessories plants throughout the United States. Only Knu-Vise Toggle Clamps have the universal action hinged base, cam activated pressure, Torrington Needle Bearings, and other improved features.

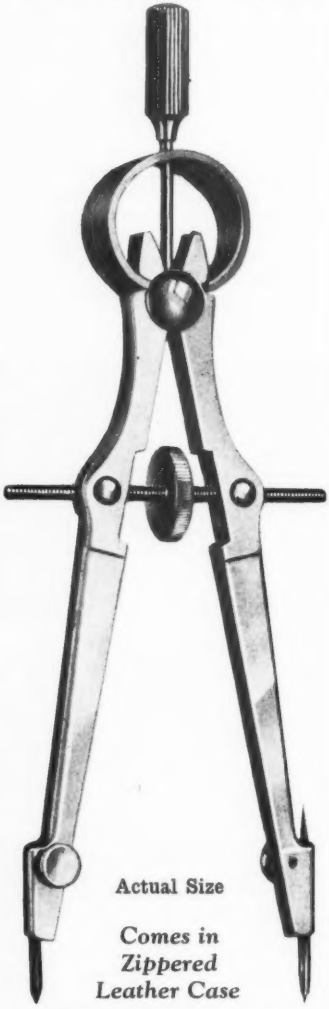
The complete line of toggle action tools—52 varied models—are available for immediate delivery. Send for catalog. Celluloid templates available at $1.00 each.

KNU-VISE INCORPORATED

16841 Hamilton Ave. Detroit, Mich.

Santa Monica Blvd. at Normandy Los Angeles, Cal.

"PETCO" BOW PENCIL
Draws Circles Up To Ten Inches



Actual Size

Comes in Zippered Leather Case

Send $5.00 Now for this New High Grade Instrument

100% American Made

The Peters Co.
305 W. Congress St. Detroit, Mich.

Tool and Die Designing Courses

(Continued from Page 41)

TOOL DESIGN VIII: Special and Universal Tools
DIE DESIGN I: Shearing Dies
DIE DESIGN II: Bending, Forming, Drawing Dies
DIE DESIGN III: Forging, Die Casting, Plastic Dies
DIE DESIGN IV: Special and Universal Dies
TOOL ENGINEERING I: Machine Tools
TOOL ENGINEERING II: Time, Cost, Routings
TOOL ENGINEERING III: Efficiency and Standardization
TOOL ENGINEERING IV: Organization and Supervision

The foregoing courses are for the duration of one semester of sixteen weeks, and some courses are offered to Mechanical Engineering students who do not specialize in Tool or Die Design or Tool Engineering.

Despatch Appoints Duff in New York Area

The Despatch Oven Co., Minneapolis, Minn., announces the appointment of Mr. Gerald B. Duff, 68 Clinton Ave., Newark, N. J., as exclusive sales engineer for Despatch furnaces and core ovens in the Newark-New York territory. Mr. Duff, who is thoroughly familiar with the proper handling and heat treatment of all types of ferrous as well as non-ferrous metals and alloys, will be glad to consult with shops and departments on their heat treating problems.

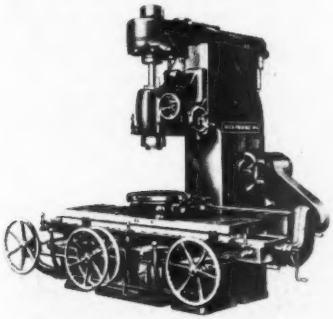
Jessop Steel Promotes Scallen; Appoints Marshall at Buffalo

H. A. Scallen, a representative in the New England territory for the Jessop Steel Co. since 1930, has been promoted to District Manager of the Hartford branch, office and warehouse of which are located at 626 Capital Ave., Hartford, Conn.

J. Hal Marshall, formerly in the Sales Department of the Composite Steel Division at the company's general office in Washington, Pa., has been appointed a sales representative in the Buffalo district. His headquarters will be at 130 Groveland Ave., Buffalo, N. Y.

New Reed-Prentice Miller and Die Sinking Machine

THE new Reed-Prentice No. 6 Vertical Milling and Die Sinking Machine, the largest of this company's well-known line of vertical millers, die sinkers, and jig borer, is equipped with positive gear drive to spindle, anti-friction drive being secured from main driving pulley to spindle through the use of Timken Roller Bearings. The top box is totally enclosed and dustproof. With V-belt motor drive, for which the machine is arranged as part of the standard equipment, the new No. 6 is well adapted for handling large dies and for doing general milling work. Main drive pulley is provided with clutch and brake for starting and stopping, conveniently controlled by two levers at front of machine table.



The machine is designed throughout to secure maximum power and rigidity. The saddle extends the full length of the table giving rigid support for heavy work. Maximum operating efficiency is obtained through power rapid traverse to table, cross or longitudinal, at 95" per minute. Twelve spindle speeds, with eight feeds available for each spindle (total range of .0015 to .200 per revolution) are secured through regular feed box. A power down feed, rotary table and cherrying attachment are available as extra equipment.

A new circular, 18-602-8P, giving construction features, specifications and special equipment, will be sent by Reed-Prentice Corporation, Worcester, Mass., at your request.

ULTRA-CHEX

A NECESSITY in TOOL and DIE SHOPS

Thousands of plants are in production for defense. Never before were precision work, interchangeability and accuracy so essential. Much of this work will be farmed out to small shops. Their work will have to be interchangeable with work turned out by large plants equipped with modern precision instruments.

ULTRA-CHEX will enable your mechanics to work to specified accuracy limits. Rejections, errors, uncertainties and disputes are largely eliminated with ULTRA-CHEX.

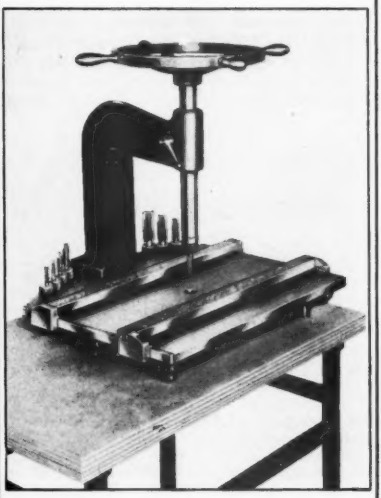
The standard ULTRA-CHEX set consists of nine blocks. .0625"—.100"—.125"—.200"—.250"—.300"—.500"—1"—2". These will give 331 combinations in $\frac{1}{16}$" and 1/100" up to $4\frac{15}{16}$". Price, Ultra-Chex with Optical Flat $25.00. Ultra-Chex only, $19.50.

MECHANICS OWN ULTRA-CHEX set. For tool and die makers who have long wanted a small set of gage blocks we offer this five-block set. With tolerances getting closer, every tool maker should have the MECHANICS OWN ULTRA-CHEX set, which consists of:
.0625"—.125"—.250"—.500"—1". Price $12.50.
ULTRA-CHEX ARE GUARANTEED ACCURATE WITHIN 8 MILLIONTHS of an inch.

Order now for prompt delivery.

GEO. SCHERR CO. INCORPORATED 128-B Lafayette St. New York, N. Y.

THE VIKING
REG. TRADE MARK
TAPPER



A PRECISION BUILT TOOL

Base, semi-steel casting, well ribbed and seasoned to prevent warping.
Two sliding parallel bars to hold work in place while tapping.
Quick changing adaptors, requiring but 5 seconds to change tap.
Steel spindle hardened, ground and lapped to a perfect gage fit.
Spindle lock for holding spindle in position.
Two spindle bearing bushings hardened, ground and lapped.
Aluminum handwheel with four inserted steel handles.
Bracket arm, semi-steel casting bottom scraped to insure spindle is perfectly square with base.

Send for Circular

THE VIKING TOOL & MACHINE CORP.
6 Main St. Belleville, N. J.

Standarized Die Parts

(Continued from Page 17)

erly this type of construction makes a very substantial production tool, but it often is very troublesome from the maintenance and repair standpoint, should only one punch be out of line.

Summarizing, the individual retainer type die has the following advantages which speak for themselves:

1. Simplicity of construction
2. Ease of assembly
3. Ease of part replacement
4. Low maintenance cost
5. Ease and speed of die changes; and many others

This type of construction should be given serious consideration wherever production runs are heavy and where holes are spaced far enough apart to use this system.

Mold Sinking Methods

(Continued from Page 26)

little hand filing, but it need not destroy the accuracy of the duplication, since the contour is there, and only some small ridges are left to file away.

Some mold cavities are formed by electroplating a coat of pure iron around a master hob, and then carburizing and hardening. The hob need not be made of tool steel, but it must be polished. A leading rubber company has developed a method of depositing iron directly on the prepared surface (dusted with powdered graphite) of a rubber tire pattern. The deposit of pure iron (99.98%) is about 50 per cent harder than cold rolled steel (scleroscope 37, 240 Brinell, or 21 Rockwell C) and may be annealed or hardened by carburizing. It is claimed that finish, as well as contour, is maintained by this process.

However, the high pressures required in plastic molding have discouraged extensive use of electroformed molds. Casting non-ferrous alloys around a hob is another method for making mold cavities. Here, too, the hardness of the cavity material and its resistance to crushing are not sufficient for the pressures of compression molding and long wearing qualities are doubtful. The method is very good for ornamental castings, as it duplicates faithfully all of the small details. Non-ferrous molds are not in general use, except where conditions warrant their use.

ALLEN accuracy
holds your work
true to close-tolerance limits

Diemakers find in Allen Hollow Screws the qualities indispensable to accurate locating of work and retention of assemblies.

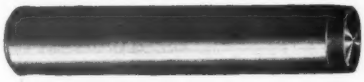
The Socket Head Cap Screws and Shoulder Screws (Stripper Bolts) are *"pressur-formd"* to preserve *continuous* steel-fibres shaped to the contour of the screw head, increasing strength for tight set-ups. The Allen *"duo-process"* threading makes the axial fibres of the steel conform to the contours of the thread profile, — structurally reinforces thread-accuracy that evenly distributes friction-pressure over the entire length of the thread.

The Dowel Pins (like the Hollow Screws) are made of special *Allenoy* steel, ground to exceedingly close tolerance limits, with tensile strength of 240,000 to 250,000 lbs. per square inch.

Ask for descriptive folder G-21

THE ALLEN MANUFACTURING COMPANY
Hartford, Connecticut, U. S. A.

TRU-GROUND SHOULDER



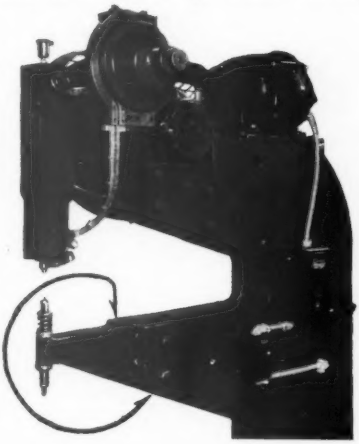
SCREWS • DOWEL PINS

for more solid rivet joints per RIVITOR *(minimized change-over time)*

Sustained production with but small loss of time for "change-overs" is possible with this "Interchangeable Horn Type" Rivitor.

Complete horn sections, carrying the anvil mechanism, may be transferred to another Rivitor (this type) which has the required throat depth to get the next rivet locations.

This not only permits maximum machine utilization but also accommodates more automatic feed riveting without having to have additional complete machines. At the same time, the deep throat machines can be kept busy with work requiring that accommodation. Information on these and the other type Rivitors will be sent promptly; address The Tomkins-Johnson Co., 630 N. Mechanic St., Jackson, Michigan.



this is a TOMKINS-JOHNSON *product*

Recent Industry Publications

"TIMKEN GRAPHITIC STEELS"—about half of this 16-page booklet is given over to questions and answers on the special machining, tensile and impact properties, heat treatment and grinding wheel recommendations for three of Timken's graphitic steels—Graph-Sil, Graph-Mo and Graph-Tung. A good part of the remainder of the booklet is given over to "case histories" of twenty-four tools, dies and parts. Working drawings with accompanying explanations offer reference data in planning new tools, dies and parts. The reference data is divided practically by types of service expected and heat treatment based on sizes and thicknesses of parts. This booklet is of value to every tool designer, steel treater and buyer of alloy steels. A copy of Bulletin P—"Timken Graphitic Steels"—will be sent on request. Write The Timken Roller Bearing Co., Steel and Tube Division, Canton, O.

GEORGE SCHERR DIAL TEST INDICATOR—The George Scherr Co. has just announced its new GS Dial Test Indicator which utilizes a simple lever arm movement instead of the rotating multiple gear and pinion trains usually employed. The dial is graduated in .0001" with a plunger travel of $\frac{5}{16}$". The company has just announced a new four-page illustrated circular which is available on request. Write George Scherr Company, 128-B Lafayette St., New York, N. Y.

"ALL-IN-ONE"—Equipment for Grinding and Lapping—a tool grinder which, with standard tip cutting, protractor and drill grinding attachments, is capable of accurately producing any form of tool tip and subsequently duplicating it. Cutting tools including cemented carbides, Stellite, Rexalloy and bonded tungsten as well as high speed steels, can be ground successfully with "All-In-One" Grinder. An 8-page Bulletin, No. 409, giving full descriptions of "All-In-One" attachments and accessories with prices will be sent on request. Write T.C.M. Manufacturing Co., 311 First St., Harrison, N. J.

MALL PORTABLE FLEXIBLE SHAFT GRINDERS—direct drive, high speed (18,000 r.p.m.) flexible shaft grinders particularly handy for diesinking work, high speed filing, routing and finishing operations in the tool room and die shop, in two sizes, are described in insert 25-26 of Catalog 339. Specifications and prices of grinders, mountings, spindles and shaped grinding wheels are given. Ask for insert 25-26 when you write Mall Tool Company, 7727 S. Chicago Ave., Chicago, Ill.

GRINDING "HAYNES STELLITE" CUTTING TOOLS—a 32-page booklet describes the characteristics of two new, improved grades, J-Metal and "2400", of the well-known Haynes-Stellite brand of cobalt-chromium-tungsten metal-cutting tools; gives recommended wheels for their grinding and detailed grinding procedure for sharpening single-pointed tools, inserted blade face milling cutters, solid milling cutters, end mills, counterbores, reamers, circular and dovetail form tools. Ask for Form 571 when you write the grinding wheel manufacturer, Norton Company, Worcester, Mass.

CIRCULAR CL-2 illustrates the advantages of the Hartford Super-Spacer by picturing this superior spacing device employed in a number of tool room operations. The Drilling Attachment is also shown. Write Hartford Special Machinery Co., 281 Homestead Ave., Hartford, Conn.

CLEVELAND FILES, the new Catalog of the Cleveland File Company, lists the groups of "Super Duty" files and rasps made by this company; a section devoted to Special Purpose Files includes tang flat, half round and knife files for the tool room and die shop and milled curved tooth files for the aircraft industry shops. A special feature is the illustration and description of the file marking system, originated by this company. Excellent instruction material on how to use files and to take care of them, and on alphabetical index of applications as well as types of files make the Catalog very practical. Write to the Cleveland File Company, 3403 Hamilton Ave., Cleveland, O.

PRECISION SURFACE GRINDER No. 20—the newest addition to the Covel line of industrial grinders is a horizontal hydraulic reciprocating table type. High speed, elevating hand wheel and grinding wheel truing device are a few of many features described in Bulletin 11-40P just issued by Covel Manufacturing Co., Benton Harbor, Mich.

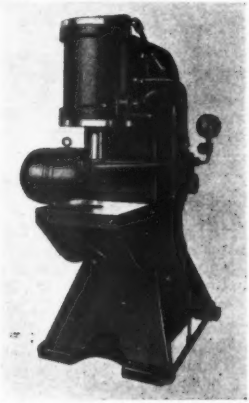
1941 MODERN PLASTICS CATALOG—previously a monthly issue was published as the annual catalog and directory number, but this year Modern Plastics Catalog, having outgrown such a restriction, is published independently. A handsomely bound 476-page book, liberally illustrated with many excellent color reproductions, the classifications of contents has been improved to make reference to raw materials, processing procedures and equipment easier and faster. The 1941 Catalog is both exhaustive and comprehensive. The section on molding and fabricating is larger and more practical than ever. In addition to the **Plastics Properties Chart,** which is completely revised, charts on **Solvents** and **Plasticizers** are included for the first time. The rapid technical strides being made by the plastics industry is also reflected in the new editorial material, written by specialists covering every phase of the industry. Marginal tabs, a bibliography, nomenclature and a very complete directory make the 1941 Catalog more convenient than ever to consult. At $3.50, the 1941 Modern Plastics Catalog is an excellent buy for the mold builder, the custom molder, the advanced student of the plastics industry as well as the beginner. Orders may be sent to Breskin Publishing Corp., 122 E. 42nd St., New York City, N. Y., or to the editor of The National Tool and Die Journal.

FRAY ALL ANGLE MILLING ATTACHMENTS, a well illustrated bulletin printed in color, including the new Type C (Quill Type) Full Universal Milling Attachment, is now available to the trade. The unusual specifications of all

(Please turn to Page 48)

New Greenerd Hydraulic Presses

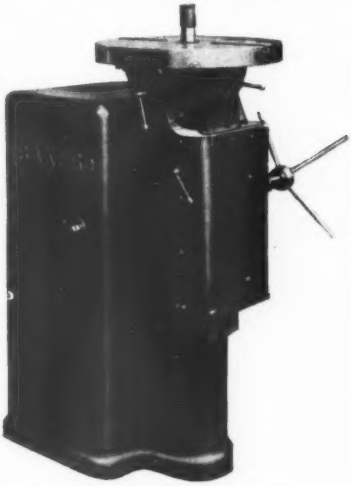
THE Greenerd Arbor Press Co., Nashua, N. H., announces that two new 30-ton Hydraulic Arbor Presses—the No. H-70, a conventional design self-contained press and the No. H-70-P, a pull type, also self-contained, are now ready for the market. The No. H-70 Greenerd Hydraulic Arbor Press, illustrated, has a pressure variable from 6 to 30 tons on the down stroke and receives work up to 22" diameters with a 14" height over the working table. The motor and pump, directly coupled, are mounted on opposite sides of the main housing. The ram, of heat treated alloy steel, hardened and ground, is $2\frac{1}{16}$" in diameter, with a one inch hole two inches deep equipped with a hardened shoulder plug.



Rapid traverse speed of ram up to 15 tons pressure at the rate of 138 inches per minute can be instantaneously changed over to a working speed of 38 inches per minute within the range of 15 to 30 tons pressure. While standard equipment includes a 10 HP, 1200 rpm motor and starter for 220/440/550 volt, 2 or 3 phase, 50 or 60 cycle, the press may be equipped with a 5 HP motor and smaller hydraulic pump (model H-70-CD). The pull type (H-70-P) is designed for assembly and other jobs that require a pull rather than a push.

Full details on the new No. H-70 and H-70-P 30-Ton Hydrau'ic Arbor Presses will be sent on request. Address Greenerd Arbor Press Co., 3 Reservoir St., Nashua, N. H.

Save Valuable Tool, Gage and Die Making *Time*
by using
BAKER
Contour Grinder



TOOL ROOMS AND DIE SHOPS WILL RECOGNIZE THESE NUMEROUS ADVANTAGES:

Convenient working height, complete visibility.
Vertical spindle mounted on large precision anti-friction bearings. Three speeds from Vee Belt drive.
Cam actuated reciprocating action, which can be disengaged when dressing the wheels.
Well ribbed 18" table with T-slot to front and rear. Mounted to provide angles for grinding of angular relief in dies, etc.
Wheels quickly interchangeable and held securely.
Quick acting capstan control of table slide.
Assembly protected against grindings and dirt.

For full details, write today for Contour Grinder Folder

BAKER BROS., INC.
TOLEDO OHIO

Recent Industry Publications

(Continued from Page 46)

types of high speed and heavy duty back geared attachments and accessories are presented. For a copy of All Angle Milling Attachment Bulletin write Fray Machine Tool Co., Glendale, Cal.

"CRUCIBLE NEWS"—The latest winter edition of this interesting 32-page house organ of the Crucible Steel Company of America contains practical stories on the applications and use of Tool, Alloy, Stainless and other specialty steels. The leading article "Steel on Wings" reviews the S.A.E. and other steels made by Crucible for plane engines and other parts. A list of branches and warehouses is included. A copy of the new issue of "Crucible News" will be sent on a request made to Crucible Steel Company of America, 405 Lexington Ave., New York City, New York.

ALLEN SET AND CAP SCREWS—a new circular listing tables of Allen Hollow Set Screws, Allen Pressur-Formd Cap Screws, Allen Shoulder Screws, Allen Dowel Pins and Allen Pipe Plugs. A brief description of Allenoy steel is also included. Ask for descriptive folder G-21. Write Allen Mfg. Company, Hartford, Conn.

BLACK & DECKER PORTABLE ELECTRIC TOOLS—The new 1941 catalog of this important manufacturer of portable electric tools, includes three sizes of bench grinders, five different sizes of portable die grinders, their line of Scrugun, and other portable electric equipment. Saw blades, metal cutting saws and abrasive discs are also included. Prices are given for all equipment and parts. For your copy write Black & Decker Mfg. Co., Towson, Md.

ONSRUD B-1 AIR TURBINE GRINDER—a 75,000 r.p.m. precision grinder designed for fine tool and die grinding, is described in a 4-page illustrated circular. A copy of this Circular P will be sent you promptly. Write Onsrud Machine Works, Inc., 3914 Palmer St., Chicago, Ill.

JESSOP NON-MAGNETIC STEEL—a 4-page circular describes this austenitic, non-magnetic steel that can be readily formed, welded, machined or blanked. Electrical and physical properties, analyses and suggested applications are tabulated. For a copy, write Jessop Steel Co., 610 Green St., Washington, Pa.

SUNNEN PRECISION HONING MACHINE—an 8-page Bulletin describes this machine for accurately sizing and finishing internal cylindrical surfaces. Model "MA" takes work from .185" to 2.400" diameters and up to 7" in length. Write for your copy to Sunnen Products Co., 7985 Manchester Ave., St. Louis, Mo.

"HOW TO SPEED UP PRODUCTION WITH VARIABLE SPEED CONTROL"—a 24-page booklet cites 36 specific examples in all types of industrial plants in which speed control made possible definite production increases and advantages. Of particular interest to tool rooms and die shops are the examples showing the modernizing of obsolescent machine tool drives with REEVES Vari-Speed Motor Pulleys and Transmissions. The three basic units—Variable Speed Transmission, Vari-Speed Motor Pulley and Motodrive (combined motor, speed varying mechanism and reduction gears) are described. Copies of this booklet, designated as form G-412, will be sent on request by Reeves Pulley Co., Columbus, Ind.

STARRETT GROUND FLAT STOCK FOLDER—Ground Flat Stock No. 495, made of first quality tool steel ground to within .001" in thickness, annealed to be easily machinable, is indispensible for making templates, gages, test and cutting tools, parallels and machine parts. Ask for Circular P which shows a table of the standard sizes and thicknesses of ground flat stock, with prices. The L. S. Starrett Co., Athol, Mass.

BETHLEHEM'S 8-TOOL STEEL KIT—a group of data sheets on eight Bethlehem tool steels that can handle 90 per cent of the jobs in any shop is being mailed in a convenient kit to shop executives, superintendents and foremen upon request. For your kit, write Bethlehem Steel Co., Bethlehem, Pa.

1941 SOUTH BEND GENERAL CATALOG—This 112-page book, one of the most complete lathe catalogs ever published, shows 50 different sizes and types of South Bend Back-Geared, Screw Cutting Lathes for tool room, production and general shop use. Lathes in sizes of 9", 10", 13", 14½", 16" and 16"-24" swing, each in several different models with motor drive and countershaft drive, in quick change gear and standard change gear. New equipment shown includes the Model "A" 9" Workshop Tool Room Lathe; the 10" Swing 1⅛" Collet Series "S" Lathes; and the 10" Swing 1" Collet Lathes. A copy of the new catalog, No. 100 AP, will be sent on request to firm or individual. Write South Bend Lathe Works, 198 E. Madison St., South Bend, Ind.

THE HAMILTON "PORTELVATOR"—a standard tool, die and press room portable table for fast and safe handling of dies, jigs and fixtures. Made in two sizes for loads of 2000 to 5000 pounds. Illustrated circular and prices on request. Address The Hamilton Tool Co., 220-248 North B St., Hamilton, O.

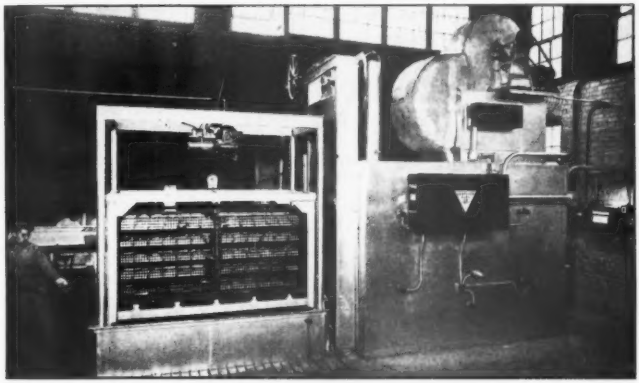
HOVIS INTERCHANGEABLE PUNCHES AND RETAINERS—the complete line of standardized piercing punches, button dies and retainers are given with full specifications and prices in Hovis Catalog CP-3, a copy of which will be sent on request. Address Hovis Screwlock Company, 8100 East Nine Mile Road, Van Dyke (Detroit), Mich.

BAKER CONTOUR GRINDER—a strictly tool room and die shop tool, with cam actuated reciprocating action, complete visibility, three speeds, quick acting capstan control of table slide and other features, is described in Contour Grinder Folder. A copy will be sent promptly on request. Address Baker Brothers, Inc., Toledo, O.

COMPOSITE STEEL DIE SECTIONS—The Composite Steel Die Sections Engineering Data Folder of the Forging and Casting Corporation gives full specifications of this well known line. Send for your copy. Forging and Casting Corporation, Ferndale (Detroit), Mich. General Catalog, FCC Products and Services, will also be sent at your request.

New Despatch Oven for Heat Treating Non-Ferrous Alloys

A NEW Despatch furnace already in considerable use for the heat treatment of aluminum and magnesium alloys,



has a number of advanced features including an oversize, large volume, high static pressure fan to assure rapid heat penetration and an interior uniformity of 5 degrees plus or minus, and a novel exploring system consisting of eight thermocouples, four mounted on each side wall.

(Continued on Page 50)

Precision and General Machine Work

Tools Dies Gages Jigs
Special Machines Fixtures

Limited Capacities Open for
PLANER WORK

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Boring Mill Experimental Work

DELIVERIES TO MEET SPECIAL DEMANDS

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9320 WOODLAND AVE. CLEVELAND, OHIO

Detroit Representative:
J. O. Stephenson 2618 Fourth Ave., Detroit, Mich. CAdillac 7261

One Man and a "Portelvator"

No shop is complete without it.

Lift and move 2000 to 5000 pound dies, jigs and fixtures easily and safely. This **Hamilton Portable Table** quickly overcomes its cost by eliminating costly mishaps and breakage and in actual time saved. Two standard sizes.

Also Special Sizes Up To 20 Ton Capacity

Write for circular and prices

THE HAMILTON TOOL COMPANY

220-248 North B Street Hamilton, Ohio

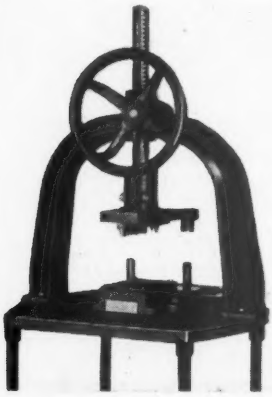
New Despatch Oven

(Continued from Page 49)

The illustration shows, in addition to the furnace, a ten-tray rack in position on the elevator used to drop the castings into the quench tank. Elevator and quench tanks are also of Despatch design. Approximately 1200 pounds of aluminum alloy castings are loaded on the rack, which is then pushed into the furnace manually on rollers. The load is then heat treated at 960 degrees F for from 12 to 18 hours, depending on the cross sections of the castings. The lift door of the furnace is then opened, the rack is pulled onto the elevator and the load is dropped into the quench tank of boiling water. Speed of quenching is essential in heat treating of aluminum alloy castings—the Despatch System takes 18 seconds from furnace to quench tank. On this job 40 seconds was allowed for this operation—so that there was an ample safety factor.

This furnace has inside working dimensions of 4′ wide, 4′ high and 8′ long, heated by a Despatch 100 KW open coil heating system which requires the full capacity for the first two hours only, tapering off to 25 or 30 KW per hour during the stoking period. An outstanding feature is the oversize fan designed to remove air at velocities exceeding 17 to 20 miles per hour through the distributing ducts of most recent design especially adapted for heat treatment of non-ferrous metals of any shape. A safety limit switch, actuated when contactors stick or temperature control instrument fails, prevents load damage.

Full details on the new heat treating furnace will be given on request. Write Despatch Oven Company, 600 Ninth St., S. E., Minneapolis, Minn.



Lacey

DIE-FITTING MACHINE

A handy, movable and powerful tool for fitting punches to dies, quickly and efficiently. Punches and dies are always properly aligned and, therefore, easy to separate without use of pry-bars or hammers and, therefore, without mutilation.

Large hand-wheel facilitates sensitive, yet forceful, fitting and makes it possible for the toolmaker to shear-in certain types of dies. A safety stop is provided for any position of the ram; equipped with casters, the machine can be moved about freely and used next to toolmaker's bench.

MARBURG BROTHERS, Inc. 88-92 West St. New York

Buy With Confidence

- **This directory of products lists for ready reference the names of manufacturers and dealers whose sales to Tool·Die·Machine PROGRESS readers have established them as dependable in every sense of the word. They merit your consideration.**
- **Complete information about any product may be had upon request made to the firm listed or to us.**
- **Your mention of Tool·Die·Machine PROGRESS will be appreciated.**

ABRASIVE PAPER AND CLOTH
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass. (Behr-Manning Div.)

ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.

BAR STOCK—Heat Treating
Lakeside Steel Improvement Co., 5418 Lakeside Ave., Cleveland, Ohio.

BARS—Rolled Composite
Forging and Casting Corp., Ferndale (Detroit), Michigan.

BOLTS—Stripper
Allen Mfg. Co., Hartford, Conn.
Holo-Krome Screw Corp., Hartford, Conn.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 1390 E. 30th St., Cleveland, Ohio.

BORING HEADS—Offset
Precision Tool Co., The, P. O. Box 155, Brooklyn, N. Y.

BROACHING PRESSES—Standard and Utility
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BUSHINGS—Die
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 1390 E. 30th St., Cleveland, Ohio.

CALIPERS
L. S. Starrett Co., Athol, Mass.
Lufkin Rule Co., Saginaw, Mich.

CAMS
George Gorton Machine Co., 1119—13th St., Racine, Wisconsin.

CAM DEVELOPMENT
R. J. Schmidt Co., 227 Colonial Arcade, Cleveland, O.

CAP SCREWS—Flat Head
Allen Mfg. Co., Hartford, Conn.

CAP SCREWS—Socket Head
Allen Mfg. Co., Hartford, Conn.

CARBIDE TOOLS AND BLANKS
Gairing Tool Co., The, 1631 Lafayette Blvd., Detroit, Mich.
McKenna Metals Company, 500 Lloyd Ave., Latrobe, Pa.
Motor Tool Mfg. Co., 12283 Turner Ave., Detroit, Mich.

CASTINGS—Air and Oil Hardening Tool Steel Cast to Shape
Forging and Casting Corp., The, Ferndale (Detroit), Mich.

CASTINGS—Nitri-Cast-Iron
Forging and Casting Corp., The, Ferndale (Detroit), Mich.

CHUCKS—Collet
The Tomkins-Johnson Co., 630 North Mechanic St., Jackson, Mich.
George Gorton Machine Co., 1119—13th St., Racine, Wisconsin.

CLAMPS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

CLAMPS—Toggle
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Detroit Stamping Co., 344 Midland Ave., Detroit, Mich.
Knu-Vise, Incorporated, 16841 Hamilton Ave., Highland Park, Michigan.

CLAMPS—Toolmakers
L. S. Starrett Co., Athol, Mass.

COMPOSITE DIE SECTION STEEL
Jessop Steel Co., 610 Green St., Washington, Pa.

Will a

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improve your product?

Many people have parts, such as seals, which can be improved by greater accuracy of the lapped surface.

Acme lapping technique has been developed to make possible the finishing of parts in production to within five millionths of an inch (.000005″) from absolute flatness. The cost is surprisingly low.

Our Engineering Department is available for advice on lapping problems. No obligation, of course.

May we discuss your problem?

The straightness of these bands formed by interference of light waves reflected from the flat-lapped steel surface gives a true measure of its flatness.

ACME INDUSTRIAL CO.

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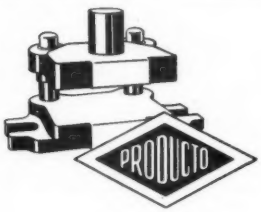

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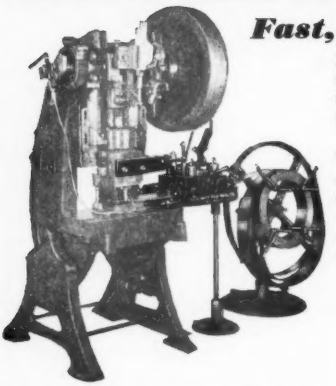

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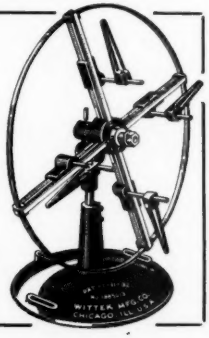

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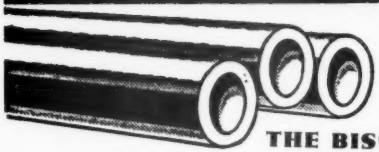

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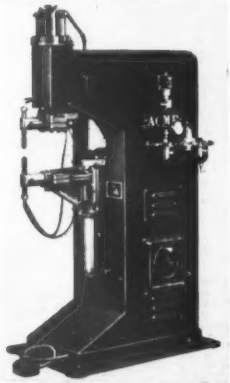

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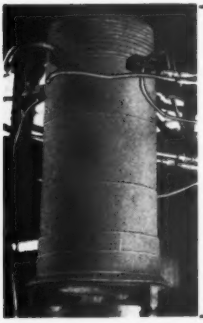

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SPEED THE WORK WITH LOCALITES

Accurate, unstrained seeing is a vital need for increased worker efficiency on tool and die production. Shops by the hundreds are solving this problem with Fostoria Localites. Nearly a thousand models of Flexible Arm Units and Canopy Units are available in the Fostoria line. Write for a catalog today.

THE FOSTORIA PRESSED STEEL CORP. ★ Fostoria, O.

Acme Spot Welders

(Continued from Page 57)

piston packed, mirror ground air cylinder cushioned on both up and down stroke, and complete air equipment including air filter.

Bulletin No. 53, "Direct Action Air Operated Press Type Spot and Projection Welders", with specifications and general capacity information is available from Acme Electric Welder Co., Huntington Park, Cal.

McKenna Completes Foreign Sales Arrangement

The McKenna Metals Company, Latrobe, Pa., has announced completion of arrangements under which United States Steel Export Company will sell Kennametal tools, tool blanks, drawing dies and wear-resisting parts abroad.

The new arrangement does not affect the sales agreement in effect with George H. Alexander Machinery, Ltd., Birmingham, England, who have the British patent rights to Kennametal and are the sales agents for Great Britain and British possessions; nor does it affect the manufacture and sale in Canada, which are carried on by Kennametal of Canada, Ltd., Hamilton, Ontario, Canada.

Filing Sawing Stoning

GREATER ACCURACY LONGER LIFE

Shop men who use the ILLINOIS Die Filing Machine know that it turns out work of higher accuracy years longer than ordinary bench filers. Quality construction is evidenced by such features as hardened and ground shafts operating in bronze bushings plus a pressure oiling system. Write for descriptive literature today.

ILLINOIS TOOL WORKS
2503 N. Keeler Ave. — Chicago, Illinois

ILLINOIS DIE FILING MACHINE

Metal Duplicating WITHOUT DIES!

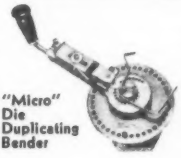
"Micro" Die Substitute Machines

A great variety of small metal parts can be made cheaper and quicker without blanking and forming dies with "Micro" Machines.

Write for prices and circular, "Metal Duplicating without Dies."

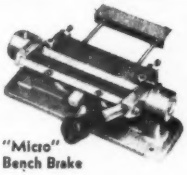
"Micro" Bench Shear

Trims duplicated stampings, shears stock sheets, etc., accurate to .001". Shearing width 6¼".



"Micro" Die Duplicating Bender

Forms angles, channels, rods, tubes, wire, strip stock, etc. Quickly set up. Accurate to .001 in.



"Micro" Bench Brake

Creates non-stock sized angles, channels, Vees, etc. Folding width 6". Accurate to .001".

O'NEIL-IRWIN MFG. CO., 316 8th Ave. So., Minneapolis, Minn.

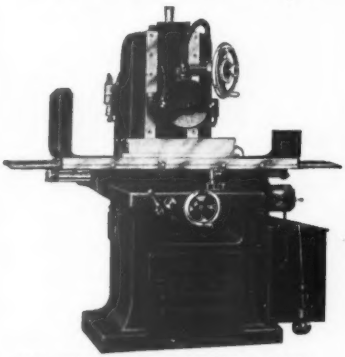
Producto Machine Announces Improved Utility Press

The improved design of the new Producto Utility Press has increased the usefulness of this versatile tool room machine. In addition to its use for shearing in punches and dies (spindle movement is through a worm and worm gear with a ratio of 34 to 1, which is operated by a hand wheel, applying power equal to 50 tons pressure), punch and die aligning, separation of punch and die holder on liner pin die sets and employment as a straightening press are capabilities. The worm and gear, because it holds the ram automatically in any desired position, assures absolute safety. The Utility Press can do work ordinarily done on other presses.

Other uses include short broaching operations, pressing out pins from die sets, and disassembling spindles or shafts from press fits in bearings.

A circular, P, on the Producto Utility Press, with specifications is available from the Producto Machine Co., Bridgeport, Conn.; or the midwest distributor, Die Supply Co., 1390 E. 30th St., Cleveland, O.

Speed* and Precision *Combined



IN GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDERS DESCRIBED IN *BULLETIN* GL-100

Gallmeyer & Livingston Co.

304 Straight Ave. S. W. Grand Rapids, Mich.

Help Your Men to Help You!

When you encourage your machinists, tool, die and pattern makers to care for their good tools in a *Gerstner* High Grade Tool Chest, you will be repaid with increased output and with a better quality of work. . . . *Help the men choose their chest from Free Catalog.*

Gerstner Tool Chests 56 Columbia Street Dayton, Ohio

Tool · Die · Machine CONTRACT SHOPS

Modern facilities for every type of designing and building service. Die Shop, Tool Room, Stamping, Assembly and Production work. All will appreciate inquiries for types of work indicated.

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***HARTFORD SPECIAL MACHY. CO.**
304 Homestead Avenue
SPECIAL MACHINES
Gears—Cams—Precision Specialties

Belleville, Illinois

DRESEL-BETZ COMPANY
Belleville, Ill.
Designers and Manufacturers of
TOOLS, DIES, JIGS
FIXTURES, METAL STAMPINGS

Chicago, Illinois

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Tools Dies Jigs Fixtures
Stampings Special Machinery

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Special Machinery
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Stampings and Assemblies

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PRODUCTION MACHINE REPAIR PARTS
Motor Drives, Gears, Worms, Tools, Fixtures
Machine Overhaul Specialists

Detroit (Cont'd)

***KOESTLIN TOOL & DIE CORPORATION**
3605 Humboldt Ave. Detroit, Mich.
Manufacturers
Sheet Metal Dies "Grindrite" Die Grinders

MAJESTIC TOOL & MFG. COMPANY
2948 Woodbridge St., East FItzroy 1011
Manufacturers
General line of Tool and Die Work, Tool Details, Parker High Speed Grinding Spindles

NORTHEASTERN ENGINEERING CO.
3125 E. Larned St. FItzroy 1275
Specialists in the Designing and Building of Progressive Dies
Dies—Tools—Special Machinery

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637 Mt. Elliott Ave. Fitzroy 4740
Designers and Manufacturers
Tools, Dies, Jigs, Fixtures
Special Machinery and Experimental Work

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Manufacturers of
Tools, Dies, Jigs, Fixtures. Special Machinery and Designing. Hoch Self-Centering Cylinder Reamers

Belleville, New Jersey

***THE VIKING TOOL & MACH. CORP.**
6 Main St. Belleville, N. J.
TOOLS—DIES—JIGS—FIXTURES—MOLDS
GAGES—MACHINES—STAMPINGS
SPECIALTIES

Jamestown, N. Y.

RANE TOOL CO., Inc.
17 Ross St. Phone 5934
Specialists In
BLANKING, FORMING and DRAWING DIES

***See larger display advertisement also.**

Cleveland, Ohio

BARTH STAMPING & MACH. WORKS
W. 34 & DENISON FL. 8411
DIES—TOOLS—JIGS—MOLDS
GLENN A. BARTH THOM. A. BARTH
J. A. BARTH J. J. BARTH

THE BUNELL MACHINE & TOOL CO.
1620 East 24th St. PRospect 2681
DIES—JIGS—FIXTURES
Gages—Models
SPECIAL MACHINERY
Swiss Jig Boring
Screw Machine Products

CLEVELAND UNIVERSAL JIG COMPANY
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Designers and Builders
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COMPLETE PLANT ROUTING and TOOLING

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Designers and Builders
HIGH GRADE DIES

GENERAL DIE & TOOL COMPANY
2067 W. 55th St. WOodbine 4736
Dies Tools Jigs Fixtures
Light Stampings Manufacturing Special Machinery

HAHN MANUFACTURING COMPANY
5332 Hamilton Ave. ENdicott 2205
Modern equipped shop for building of
MEDIUM AND LARGE
DIES, TOOLS, SPECIAL MACHINERY
Equipment includes:
3" and 5" spindle Horizontal Boring Mills
Large planers Vertical Mill

THE INDUSTRIAL MACHINE CO.
1436 East 47th Street Founded in 1903
Builders of Special Machinery
GENERAL MACHINE WORK

KIFFER TOOL & DIE CO.
5601 Tillman Ave. WOodbine 2440-2441
Manufacturers Special Machinery
Tools, Dies, Jigs, Fixtures, Tungsten Carbide Tools
SWISS JIG BORING

*See larger display advertisement also.

Cleveland (Cont'd)

THE McKINNEY TOOL & MANUFACTURING CO.
1688 Arabella Rd. KEnmore 1681
Designers and Builders
Jigs—Fixtures, Dies, Special Machinery
Swiss Jig Boring General Machine Work

NOBLE & STANTON
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Maple Heights, Bedford, Ohio
EXPERIMENTAL MACHINISTS
SPECIALISTS IN SMALL AND MEDIUM DIES
TOOLS—DIES—JIGS—FIXTURES

OHIO TOOL COMPANY
3160 West 106th St. CLearwater 3200
Designers and Builders
SHEET METAL DIES, TOOLS, SPECIAL MACHINERY, DIE CASTING DIES
RUBBER MOULDS
•
Modern Facilities
150-Man Shop

THE PARAMOUNT TOOL CO.
1392-98 East 43rd St. ENdicott 2220
JIGS, FIXTURES, DIES
Experimental Work

The PHOENIX MACHINE COMPANY
2711 Church Ave. CHerry 1048
CONTRACT GRINDING
BORING and PLANING
Manufacturers of
LESTER-PHOENIX DIE CASTING AND PLASTIC MOLDING MACHINES

A. P. SCHRANER & COMPANY
3338 Payne Ave. HEnderson 8644
EXTERNAL CYLINDRICAL LAPPING MACHINES
Special Machinery
TOOLS, DIES, JIGS, FIXTURES

***THE SOMMER & ADAMS CO.**
18511 Euclid Ave. KEnmore 0810-0811
DESIGNERS AND BUILDERS
Special Machinery
TOOLS, JIGS and FIXTURES

(Cont'd on Page 62)

Columbia TOOL STEEL

OUTPUT—

On all sides manufacturers are being pushed to the limit to get work out.

Columbia sales-service men are available to assist users of our products in checking job setups, tool steel selection and other possibilities.

If we can help, let us know.

It pays to use Good Tool Steel.

COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE PRESIDENT
GENERAL OFFICE AND MILLS
810 EAST 126TH STREET • CHICAGO HEIGHTS, ILL.

Tools with reputation

Chicago Rawhide Hammers and Mallets, manufactured from genuine Java Water Buffalo hide, are made by a firm with fifty years experience in producing quality products from rawhide. These tools make pounding safe on easily damaged surfaces. They are enduring. They are accurate. Rawhide does not "mushroom", crack or crumble. Even in unskilled hands they are safe because rawhide, tooled, compressed and tightly rolled, has resilience which cushions hard blows.

● **Chicago Rawhide Hammers are made with malleable heads and replaceable faces. Mallets are made in a dozen sizes to meet every requirement.**

CHICAGO Rawhide MFG. CO.
1280 ELSTON AVE · CHICAGO · U·S·A·

Cont'd from Page 61

***STAR MACHINE & TOOL COMPANY**
9320 Woodland Ave. GArfield 2060
Designers and Builders
Dies, Jigs, Fixtures, Gages, Special Machinery
Jig Boring—Planer Equipment

TOOLS & GAGES, Inc.
3106 East 63rd St. Michigan 7230
"Let us be your tool room."
DESIGNERS AND BUILDERS
Tools, Gages, Dies, Jigs, Fixtures
Special Machinery
SWISS JIG BORING
DIE CASTING DIES

THE VARIETY MACHINE & STAMPING COMPANY
12695 Elmwood Ave. LAkewood 8433
Designers and Manufacturers
Dies, Metal Stampings 250 tons capacity

Hamilton, Ohio

***THE HAMILTON TOOL COMPANY**
220-222 North B Street
Designers and Builders of
Tools, Dies, Jigs, Fixtures, Special Machinery
The Hamilton Portable Elevating Table

New York City, N. Y.

CONRAD & MOSER
8 East 12th St. New York City
Machine Tools & Molds, Parts & Machines
Aluminum Cast Parts—Aluminum Sheet Formed Housings

THE S & R FOLDING MACHINE COMPANY, INC.
841 E. 134th St. Melrose 5-7830
Economical Machine Work Done.
Let us quote on producing machine parts for you. We are equipped to do GENERAL MACHINE WORK *of all types.*

*See larger display advertisement also.

Tool Room Grinding

In February we will publish the first of a series of reader requested articles on tool room grinding. The first article will deal with Surface Grinders and their tool room applications. Other types of grinders used in the tool room and die shop will be treated subsequently.

The Editor

ACROMARK
TRADE MARK
TOUGH
STEEL LETTERS & FIGURES, NUMBERING MACHINES, MARKING MACHINES, STAMPS & DIES
. . .
MARKING PROBLEMS INVITED
. . .
SEND FOR LATEST CATALOG
THE ACROMARK CORPORATION
H. O. BATES
261 North Broad Street
ELIZABETH, N. J.

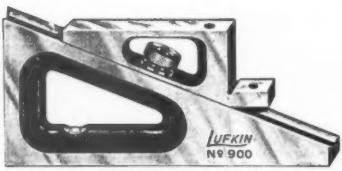
SHOP AIDS

THE STARRETT BOOK FOR MACHINISTS' APPRENTICES, volume I of the Starrett Books, treats briefly but adequately the elementary features most essential to the advancement of apprentices and students in industry shops and technical schools. Sections on use of precision hand tools, bench work, tool-making jigs and fixtures and grinding are of particular interest to tool and die makers' apprentices. Elementary shop mathematics, tables and a detailed index add to the value of the Starrett book. Copies at 75 cents may be obtained from the L. S. Starrett Co., Athol, Mass.

"PRACTICAL LESSONS IN ARC WELDING"—a 98-page booklet published by Hobart Brothers Co., Troy, O., incorporates the instruction material from the same company's arc welding manual. In this separate form the lessons will be valuable to both beginners and to men interested in improving their welding technique. The booklet is available from the Hobart Brothers Co. at 50 cents.

12 EASY LESSONS IN THE FUNDAMENTALS OF MACHINE SHOP PRACTICE—in calendar form, with each page a pictorial presentation of a principle and basic machine, has been issued by Continental Machines, Inc. Due to the great demand for these lesson-calendars, preference will be given to shops and firms maintaining apprentice training courses. Write Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis, Minn.

DIE ESTIMATING—by George Dannes, is a complete presentation of a practical, sound method of pre-determining the time required for each die making operation. A supplement, carrying all necessary tables, is included. Price per copy $1.55, postpaid. Send order to Editor, this publication.



MORE WORK

Because of the many exclusive features in the Lufkin Master Planer Gage, it handles jobs for which ordinary gages are unsuited. It can be used as an Adjustable Parallel; with an Indicator in transferring measurements; with a Sine Bar in grinding angles, and with Gage Blocks in building up work on a surface plate.

WRITE FOR FREE CATALOG.

LUFKIN
SAGINAW, MICHIGAN · New York City
TAPES · RULES · PRECISION TOOLS

5000 Shapes and Sizes Grobet Swiss Files

Write for Catalog YF

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files.

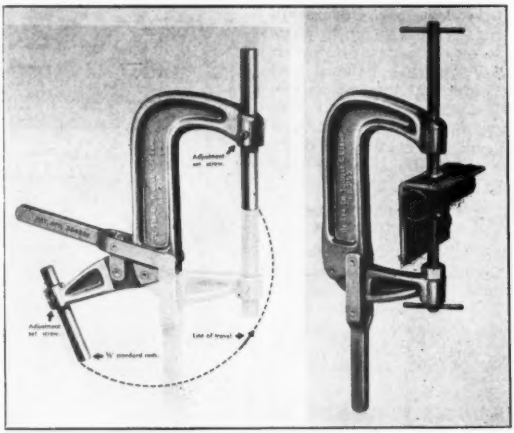
Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

Ask also for catalog YM on Files for Filing Machines; catalog YR on Rotary Files and Diesinkers' Burs.

GROBET FILE CORP. of AMERICA • 3 PARK PLACE NEW YORK, N. Y.

New "C" Clamp Has Two Holding Rods, Toggle Action

A NEW, portable "C" clamp which the manufacturer believes combines all the advantages of the old clamp with swift toggle action; holds together many types of work not possible before, is now being produced by Detroit Stamping Company. The new clamp has two holding rods instead of one; and when released by toggle action, the entire lower half swings clear of the work. This makes it possible for the operator to get around obstructions in fixtures, and to take in and clamp firmly such pieces as angle iron or T-shaped iron, which were formerly difficult, if not impossible, to handle.



This new toggle action clamp is now made in two models. One has two threaded rods which permit quick, easy adjustment. The other has two smooth rods which are set-screw adjusted, and is especially suited to arc welding work; having no threads to burn or damage as so often occurs with the old style "C" clamps.

The two-rod adjustment permits of holding the work at exactly the right spot; and after once set, the adjustment need not be varied until that particular job is finished.

The new clamp itself is fabricated of malleable iron, the rods of steel, the toggle handles of case hardened steel; making the whole assembly tough, and of unusual tensile strength. The manufac-

(Continued on Next Page)

THE PRECISION UNIVERSAL TOOL HEAD
brings all adjustments under absolute micrometric control without stopping tool or machine.
In Jig Borer, Milling Machine or Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, undercuts, recesses, back faces and does an almost limitless range of "headache" jobs. Send for bulletins.

Removal Notice:
We are no longer located at Bridgeport, Conn.
Send all communications, inquiries and orders to

THE PRECISION TOOL COMPANY
P. O. Box 155, Brooklyn, New York
MAin 4-1064 Cable Address: "PRETOOL-NEWYORK"

(Continued from Page 64)

turer claims that it is impossible to permanently damage or distort the toggle action "C" clamps up to a pressure of one thousand pounds.

For further details, see advertisement on page 36, or write Detroit Stamping Co., 344 Midland Ave., Detroit, Mich.

H. O. Bates Incorporates as The AcromarK Corporation

H. O. Bates, president of the company of the same name, states that the business has been incorporated under the name of The AcromarK Corporation, effective January 1. H. O. Bates becomes president of The AcromarK Corporation. This company is a leading manufacturer of marking devices, numbering machines, metal type and holders.

Despatch Oven Increases Facilities

THE Despatch Oven Company of Minneapolis, Minnesota, announces a 30 per cent increase in manufacturing floor space at their plant at 600 Ninth St., Southeast. A considerable amount of new machinery has been installed, tripling production facilities. The increase in manufacturing capacity has been made necessary, according to F. H. Faber, vice president-sales manager, because of the increase in volume of orders for ovens, heat treating furnaces and air heaters. About half of the present production is either directly or indirectly related to the National Defense Program.

New Service for Readers

Save time and trouble—use the Advertising Service described on page 66.

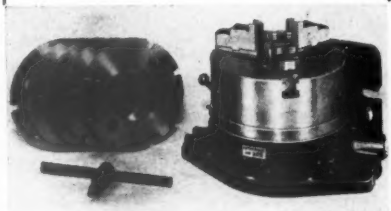
LINCO *Two Spindle*
Adjustable Drill Head

Drills two holes at once, engineered for all types of drill presses and is especially adaptable for small presses such as Canedy Otto, Demco No. 15 and similar presses. Drill centers ⅞" to 6", speeds up to 3600 R P M, capacity drills $\frac{5}{16}$" to ½". We make two sizes, the smaller, with aluminum gear case, weighs only 9½ lbs. Roller and ball thrust bearings. Same head with attachment may be used for tapping.

Descriptive Bulletin
Sent on request

LINDERME
Machine & Tool Company
12250 Coyle Ave.
DETROIT, MICHIGAN

Rapid, Accurate
INDEXING



The simple construction of the interchangeable mask plates of the Hartford "Super-Spacer" assures rapid indexing; accuracy is guaranteed by the fool-proof design. Adaptable for many tool room jobs.

Ask for Circular CL-2

THE HARTFORD SPECIAL MACHINERY CO.
281 Homestead Avenue
HARTFORD CONNECTICUT

May We Be Of Service?

To save you time and expense and to get information to you quickly on any materials, tools, parts, machines or services you may need, check the page numbers of the advertisers listed below. If the advertisements in this issue do not include items which you need, make note below and we will have data sent by reliable, established firms.

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Name..... Title.....

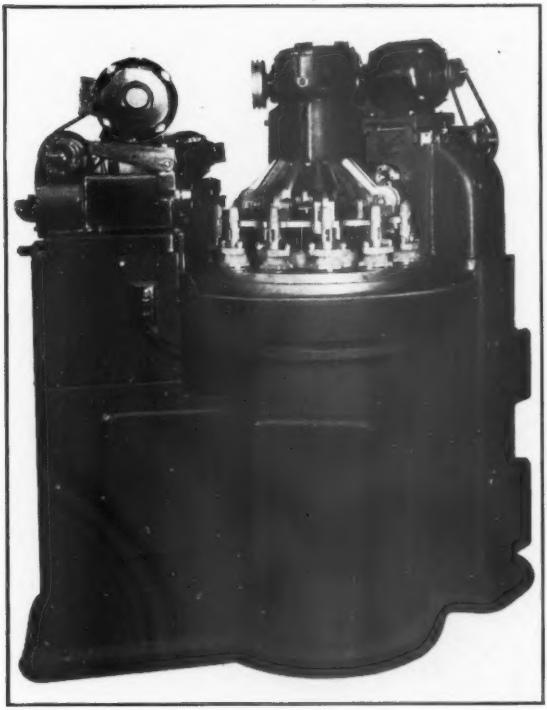
Company..... Street.....

City..... State.....

Please be sure you have checked the page numbers, if interested in products or services advertised; or the company names if you designate your requirements. Tear out page and mail to:

The National Tool and Die Journal 2460 Fairmount Blvd. Cleveland, Ohio

Special Automatic Indexing Machine Performs Multiple Milling, Drilling Operations



This machine performs three milling and one drilling operation on oil pump parts (shown in position) at the rate of approximately 550 pieces per hour.

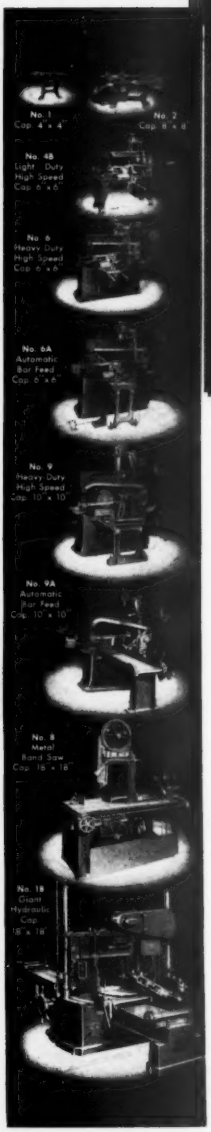
We design and build multiple operation production machines for many leading manufacturers.

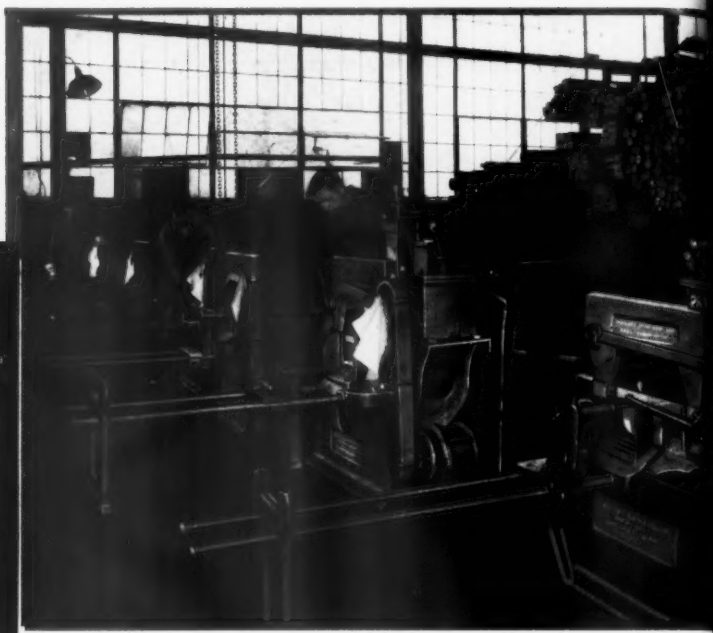
Let us quote on your requirements.

Designers and Builders of Tools, Gages, Jigs and Fixtures

THE SOMMER & ADAMS COMPANY

18511 Euclid Avenue Cleveland, Ohio





No Bottleneck Here — with this battery of high speed automatic MARVEL Hack Saws

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